LEVEL II

12

AD

Report 2302

BEACH MOBILITY TESTS ON 50,000-POUND-CAPACITY, ROUGH-TERRAIN CONTAINER HANDLERS

by
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July 1980

U.S. ARMY MOBILITY EQUIPMENT
RESEARCH AND DEVELOPMENT COMMAND
FORT BELVOIR, VIRGINIA

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Tests performed and results contained in this report are a continuation of MERADCOM Report 2241.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Sand Mobility	Material-Handling Equipment
Beach Mobility	Rough-Terrain Container Handler
Vehicle Performance	Radial Tires
Cone Index	Flotation Index
Mobility Models	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Beach mobility tests reported within are a continuation of previous testing reported in MERADCOM Report 2241, dated April 1978; the test procedures, plan of test, and soils sampling are the same as reported previously. Conclusions in this report provide the flotation index for all 50,000-pound, rough-terrain container handlers tested.

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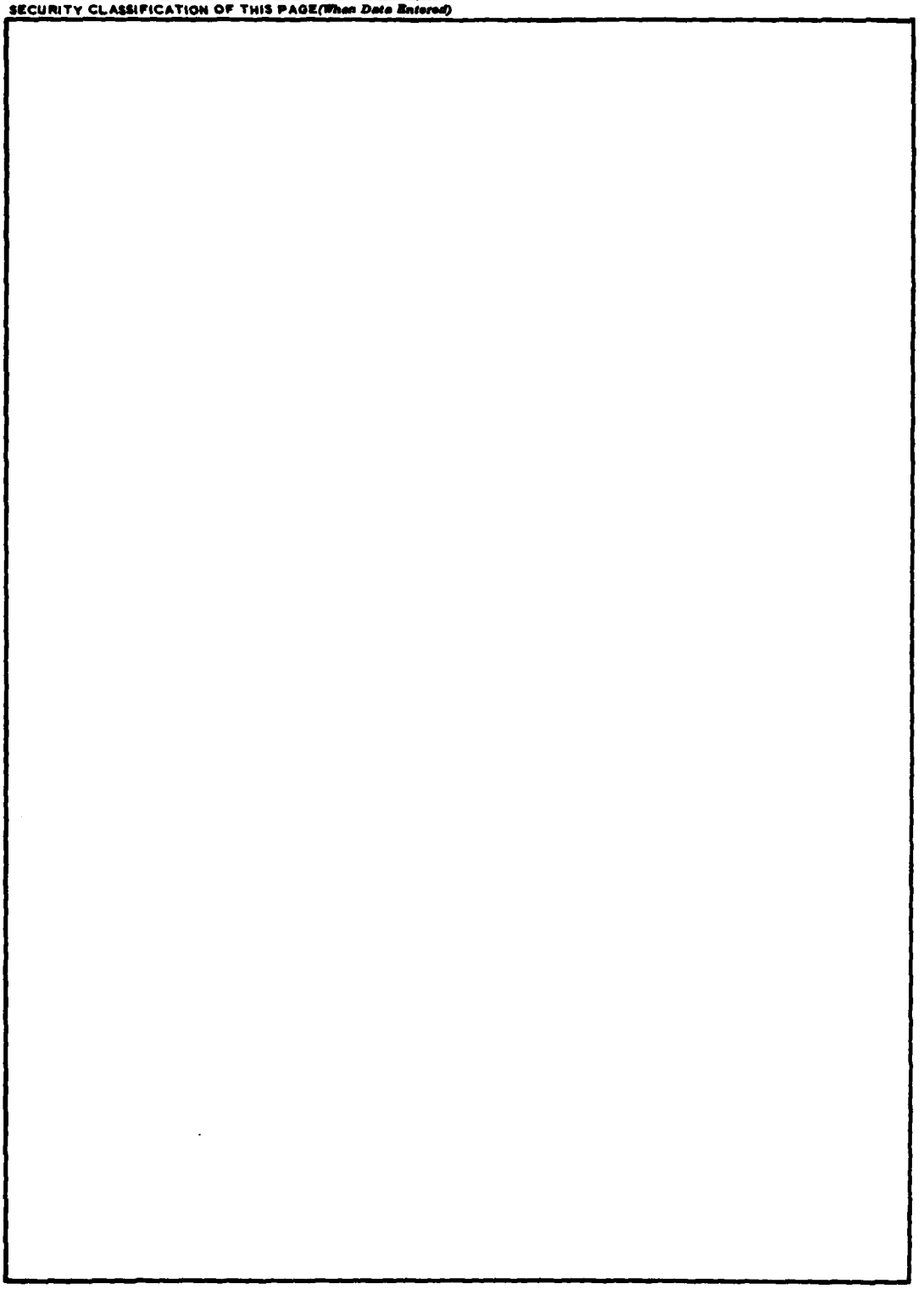
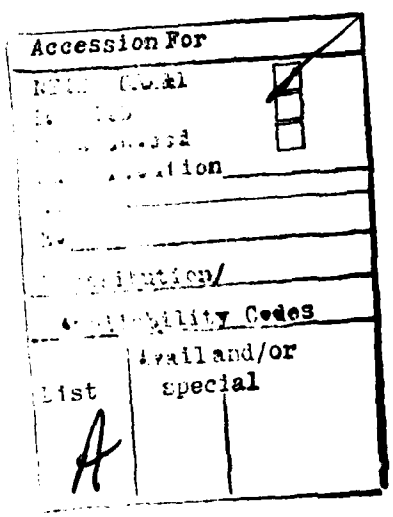


CONTENTS



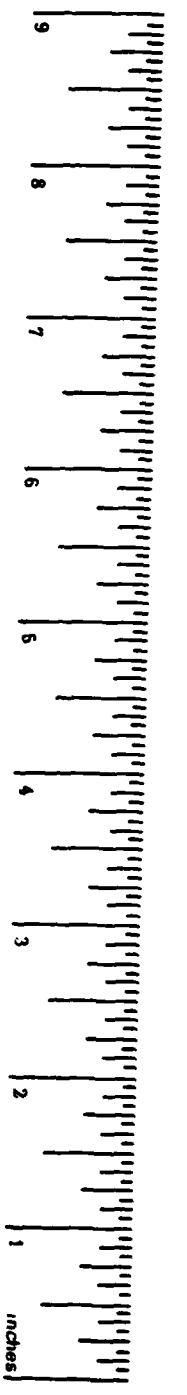
ILLUSTRATIONS

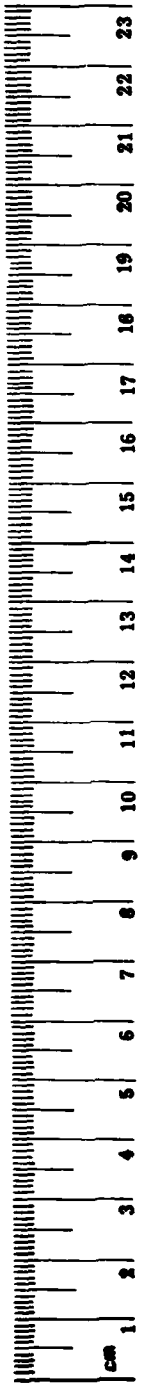
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	metric tons	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	L
pt	pints	0.47	liters	L
qt	quarts	0.95	liters	L
gal	gallons	3.8	liters	L
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	C

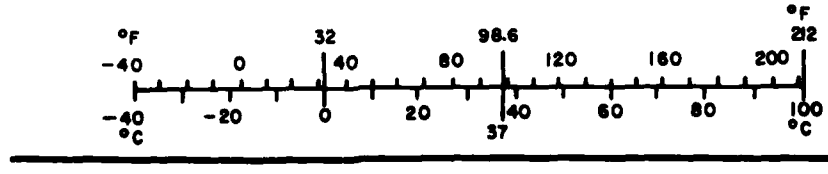
* 1 in = 2.54 cm (exactly).





Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10 000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	metric tons (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
L	liters	2.1	pints	pt
L	liters	1.06	quarts	qt
L	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



ABBREVIATIONS

AL	Axle Load
CI	Cone Index
f	Front
FI	Flotation Index
GVW	Gross Vehicle Weight
S, % S, S_{max}	Slope, Percent Slope, Maximum Slope
R	Rear
TP	Tire Pressure

BEACH MOBILITY TESTS ON 50,000-POUND-CAPACITY, ROUGH-TERRAIN CONTAINER HANDLERS

I. INTRODUCTION

In October 1977, beach mobility tests were conducted on the Clark Model 475 and the Marathon LeTourneau LeTro Porter Model 2684. The results of these tests were reported in MERADCOM Report 2241, dated April 1978. The conclusions were that the performance of both of these vehicles was as predicted by the model and in some cases better than predicted. Large, radial tires resulted in a low-ground-bearing pressure. Reduced tire-inflation pressures improved performance.

The present report includes the Beach Mobility tests conducted at the Naval Amphibious Base, Little Creek, Virginia, in June 1978 on the Clark Model 475 and the Caterpillar Model 988B, 50,000-pound-capacity Rough-Terrain Container Handlers. The Clark vehicle was tested to determine its performance in sand having a dry sand layer on top (Figures 1 and 2). The tests with this vehicle conducted in October 1977 were on essentially moist sand. The Caterpillar vehicle was tested for general sand mobility and slope performance (Figures 3 and 4). Both vehicles were equipped with Michelin radial tires. Two different tread depths of the same tread design were tested on the Caterpillar vehicle.

II. INVESTIGATION

The test procedures for slope tests and soil sampling are the same as reported in MERADCOM Report 2241, "Beach Mobility Tests on 50,000-Pound-Capacity, Rough-Terrain Container Handlers," dated April 1978.

Soil moisture and density data along with grain size distribution for this test and previous tests are included in Appendix A. Appendix B is a list of all the 50-k RTCH vehicles tested and their flotation index values.

III. DATA ANALYSIS

The results from the tests conducted on the Clark vehicle in October 1977 and the present test (June 1978) are plotted in Figures 1 through 4 of Appendix C. The data scatter in the present test was less than in the data from the October 1977 test. The agreement of the present test data was better than the previous test when compared to the predicted performance. The Cone Index (CI) average for the 0- to 6-inch layer was used in the data reduction. Based upon the agreement of the data with the predicted performance, 0- to 6-inch layer appears to be the critical layer. This indicates that the depth of

Figure 1. Clark Model 475 performing slope-climbing test without load.

Figure 2. Clark Model 475 performing slope-climbing test with load.

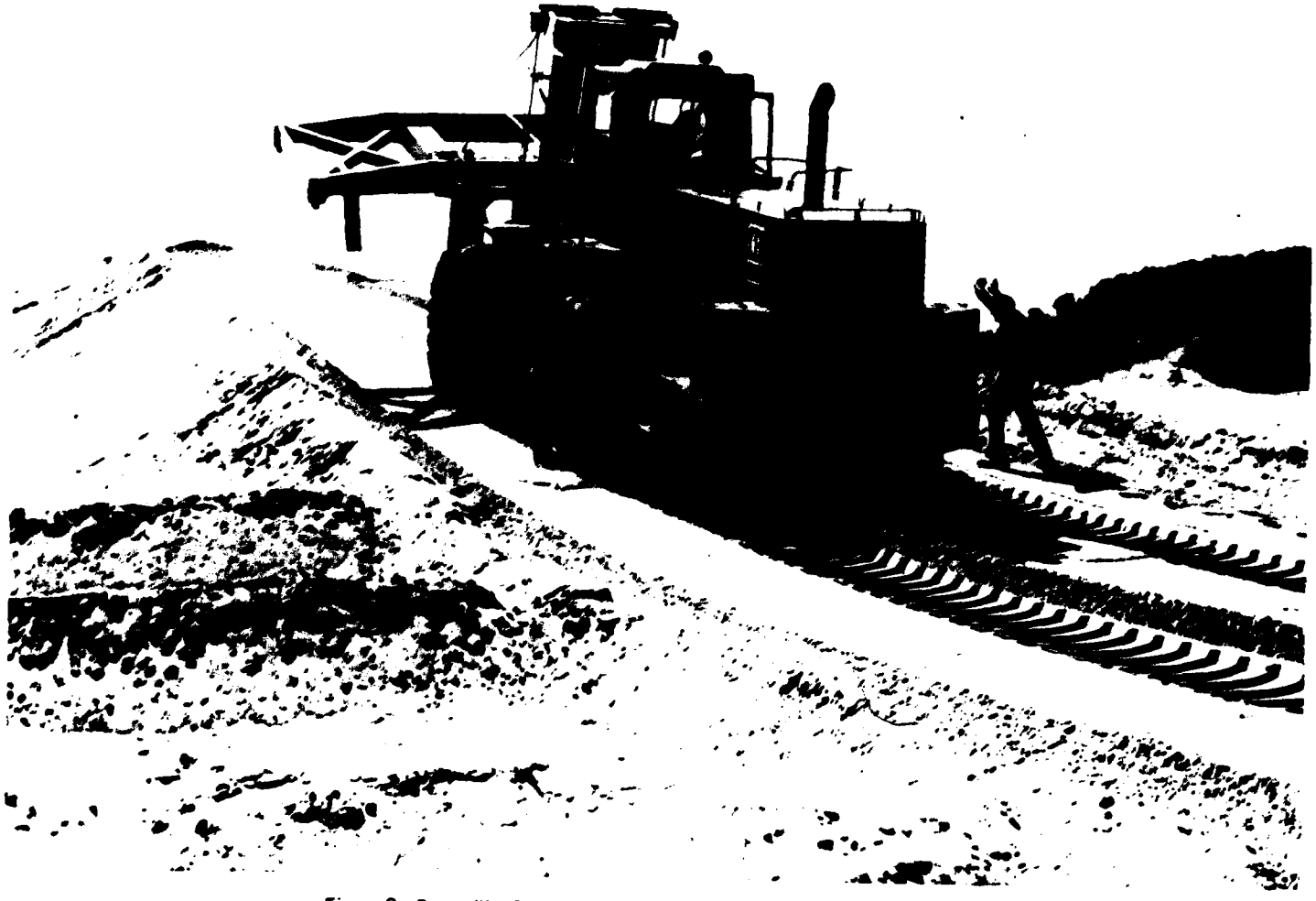


Figure 3. *Caterpillar Model 988B* performing slope-climbing test without load.

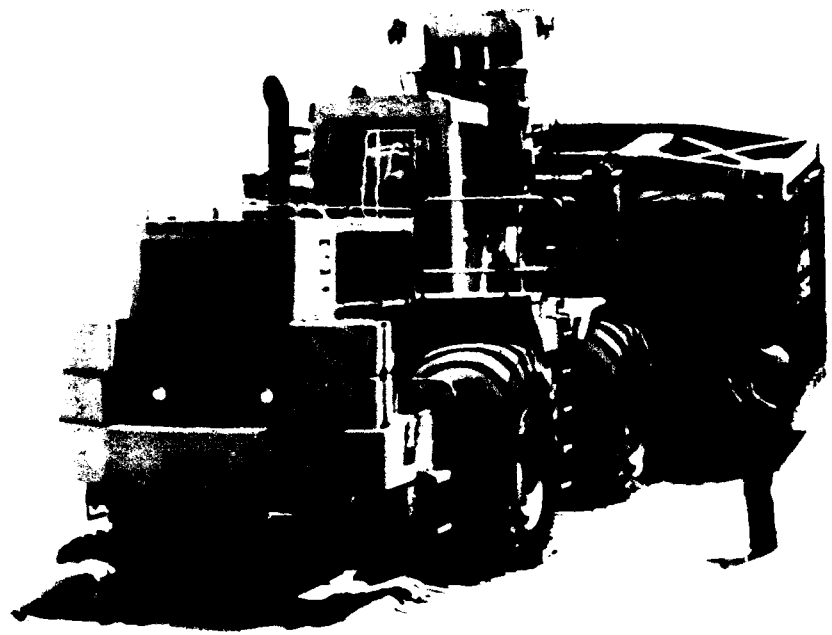


Figure 4. Caterpillar Model 988B performing slope-climbing test with load.

the dry sand layer is important. Cone Index readings were also taken in the tracks. Indications were that, after 6 inches, there was a marked difference in CI readings which also supports a 0- to 6-inch critical layer.

The Modified Cone Index Mobility Model (MCIMM) was used to predict the performance of the vehicle for various tire-inflation pressures and load conditions (Figures 1 through 4, Appendix C). The solid line curves correspond to the maximum negotiable slope (S_{max}) as a function of Cone Index (CI), obtained from the MCIMM model. The actual data points are plotted on the predicted performance curves. The data indicate that the Clark vehicle performed much better than the predicted values.

The Caterpillar vehicle was tested first with deep tread tires. The vehicle was marginal. The predicted performance was much higher than the actual test results (Figures 1 through 14 in Appendix D). The second test was made with normal depth tread tires to reduce some of the effect of the more aggressive tread. Performance was improved. Under no-load conditions, the vehicle performed better than the predicted performance (Figures 1 through 7); however, when the vehicle was loaded, a lack of torque at the wheels was noticed. This lack of rim pull resulted in poor performance (Figures 8 through 14). After investigation, it was found that the engine did develop sufficient torque, but the mismatch of torque converter caused reduction in transfer of power to the wheels.

The Flotation Index (FI) values for both Clark and Caterpillar vehicles are approximately the same (Appendix B). Under no-load conditions, the performance of both vehicles was similar; however, under loaded conditions the Caterpillar vehicle did not perform as well as the Clark vehicle because of lack of power at the wheels. This suggests that the Caterpillar vehicle would be equivalent in performance to the Clark vehicle if the Caterpillar vehicle had sufficient power at the wheels.

IV. CONCLUSIONS

The test data on Clark and Caterpillar vehicles does validate the Modified Cone Index Mobility Model (MCIMM) using Cone Index (CI) for 0- to 6-inch layer.

The model does not take into account type and depth of tire treads. However, the test data indicate that the treads do affect the actual mobility performance of vehicles in the sand. Deep aggressive treads reduce sand mobility compared to normal tread depths.

The mobility model relates sand parameters to vehicle parameters resulting in Vehicle Flotation Index factor with preassumption that sufficient power is available at the driving wheels to prevent stall.

APPENDIX A

SOIL MOISTURE AND DENSITY DATA

AND

GRAIN SIZE DISTRIBUTION

(1978, 1973, 1974, 1977 Tests)

Soil Moisture and Density Data

Year	Dune No.	Moisture Content (%) 0-3 in.	Moisture Content (%) 6-9 in.	Density (lbf/ft^3) 0-3 in.	Density (lbf/ft^3) 6-9 in.	Depth of Dry Layer (in.)
1973	9	0-2.7	1.9-3.1	–	95	3-5
1974	9	1.3-3.4	2.2-3.5	91-100	93-103	3-5
1974	10	1.1-3.1	1.7-3.5	88-96	89-97	3-5
1975	10	0.4-1.5	2.4-2.8	94-95	92-96	3-4
1975	rear	1.0-4.4	2.0-3.9	88-101	86-98	3-4
1977	9	1.5-5.5	1.7-3.9	90-97	95-106	0-¼
1977	10	1.0-5.5	1.1-4.4	91-97	95-102	0-¼
1977	rear	0.4-2.2	1.3-3.6	93-99	94-102	0-¼
1978	3	1.8-4.8	2.6-3.9	89-99	89-98	0.5-1.5
1978	9	2.0-4.2	2.5-4.3	94-97	90-97	0.5-1.5
1978	9	2.1-3.9	2.1-3.6	96-100	92-102	0.5-1.5
1978	10	0.9-3.5	1.6-3.5	89-96	90-100	0.5-1.5
1978	10	2.9-3.9	2.6-4.0	96-98	97-101	0.5-1.5

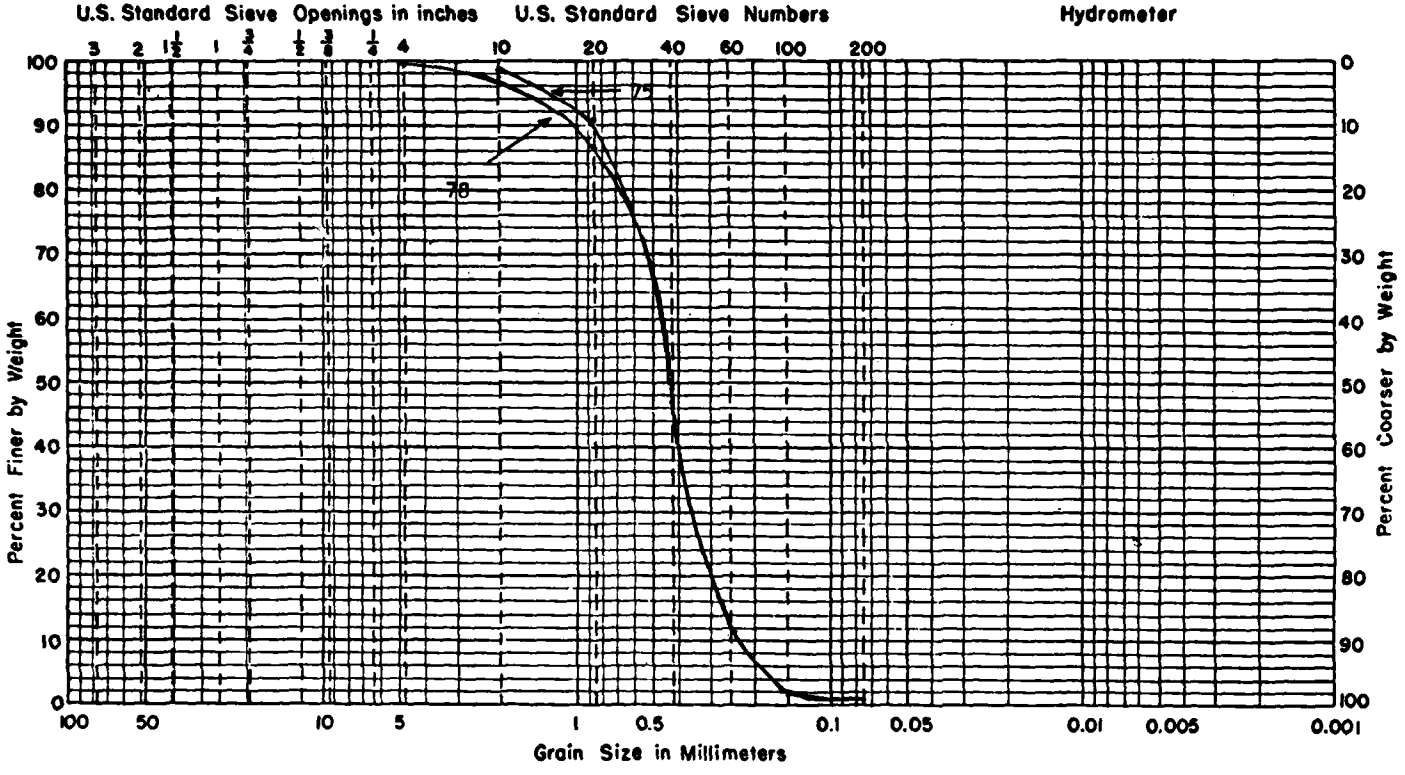
Moisture – Density Test Results 6/6 – 6/29 1978

Test No.	Date	Vehicle	TPF	TPR	Dune No.	0-3" M/C	6-9" M/C		0-3" Wet Den.	0-3" Dry Den.	6-9" Wet Den.	6-9" Dry Den.		
1	6/6	Cat	90	55	10	2.3	2.9		97.1	94.9	97.0	94.3		
1	6/6	Cat	90	55	10	0.9	1.6		93.6	92.7	99.5	97.9		
5	6/6	Cat	90	55	10	0.9	2.3		94.2	93.4	94.5	92.4		
6	6/6	Cat	90	55	10	1.9	1.6		95.8	93.9	96.8	95.3		
8	6/6	Cat	90	55	3	1.8	2.6		97.2	95.5	100.8	98.3		
14	6/7	Clark	85	50	10	2.9	2.5		96.7	93.9	98.3	95.9		
13	6/7	Cat	80	55	3	2.2	3.1		98.3	96.2	98.6	95.6		
19	6/8	Cat	75	55	3	3.6	2.0		93.7	90.4	96.7	94.8		
20	6/8	Cat	75	55	10	2.6	2.5		91.7	89.3	99.2	96.8		
25	6/8	Cat	75	55	3	4.8	3.5		95.7	91.3	101.5	98.1		
28	6/12	Cat	65	55	10	3.3	3.0		93.3	90.3	98.6	95.7		
29	6/12	Cat	65	55	3	1.9	3.2		101.0	99.1	98.9	95.8		
35	6/12	Cat	65	55	3	3.7	–		92.3	88.9	–	–		
37	6/12	Cat	65	50	10	3.0	3.5		98.3	95.5	97.7	94.4		
40	6/12	Cat	65	50	3	2.1	3.9		94.9	93.0	92.9	89.4		
44	6/12	Cat	65	50	3	2.7	2.6		96.3	93.8	99.6	97.1		
45	6/12	Cat	65	50	3	2.6	2.3		96.5	94.1	99.2	97.0		
49	6/13	Cat	65	45	10	2.1	2.5		94.3	92.4	97.0	94.7		
50	6/13	Cat	65	45	3	2.9	3.2		97.0	94.3	98.4	95.4		
51	6/13	Cat	65	45	10	3.5	3.1		94.0	90.8	93.0	90.2		
64	6/14	Clark	85	40	10	1.5	2.6		96.5	95.1	99.5	97.0		
65	6/14	Clark	85	40	9	2.0	4.3		96.4	94.5	93.8	89.9		
88	6/15	Clark	70	40	10	2.2	2.2		95.3	93.2	97.9	95.8		
105	6/15	Cat	60	45	9	3.2	3.3		98.6	96.7	96.7	93.6		

Moisture – Density Test Results 6/6 – 6/29 1978

Test No.	Date	Vehicle	TPF	TPR	Dune No.	0-3" M/C	6-9" M/C		0-3" Wet Den.	0-3" Dry Den.	6-9" Wet Den.	6-9" Dry Den		
110	6/15	Cat	65	30	10	2.8	1.8		95.6	93.0	98.3	96.6		
113	6/16	Clark	65	30	10	2.6	2.3		93.4	91.0	102.6	100.3		
77	6/14	Clark	80	40	10	2.0	–		94.2	92.4	–	–		
79	6/14	Clark	80	40	9	3.5	2.5		97.8	94.5	98.7	96.3		
87	6/15	Clark	70	40	9	4.2	3.5		97.4	93.5	100.8	97.4		
			Cat 988B With 1.5" Tread Depth											
1	6/28	Cat	90	55	10	2.9	2.6		101.1	98.3	103.7	101.1		
2	6/28	Cat	90	55	9	3.8	3.5		100.1	96.4	101.9	98.5		
9	6/28	Cat	80	55	9	3.9	2.9		101.5	97.7	104.6	101.7		
10	6/28	Cat	80	55	9	2.5	2.1		101.5	99.0	101.4	99.3		
25	6/29	Cat	65	55	10	3.1	3.5		98.9	95.9	100.6	97.2		
26	6/29	Cat	65	55	9	2.1	3.6		97.9	95.9	95.4	92.1		
37	6/29	Cat	65	50	9	3.2	3.2		103.2	100.0	102.5	99.3		
38	6/29	Cat	65	50	10	3.9	4.0		100.7	96.9	102.7	98.8		
45	6/29	Cat	65	45	9	3.0	3.2		102.5	99.5	105.4	102.1		
	Surface moisture was 0 – .5%.													
	The dry sand layer was an approximate .5 – 1.5 inches deep.													

GRAIN SIZE DISTRIBUTION



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

No.	Depth	Natural Water Content	L.L.	P.L.	P.I.	Classification
	0 - 9"		NA	NA	NA	

Grain Size Distribution

Project: BEACH MOBILITY TESTS 1978

No. Location LITTLE CREEK VA. Date 6 - 28 JUNE

Plotted by THOMAS

Soil test form #5

ARMY-FORT BELVOIR

Soil Moisture and Density Data

1973 Soil Moisture and Density Data

Station	Moisture Content (%)			Density (lbf/ft^3)	Descriptive Moisture Classification	
	Surface	1 to 3 in.	6 to 9 in.	6 to 9 in.	Surface	Subsurface
			A. Drawbar Lane			
0 + 00	0-1.0	0.5-1.0	1.0-3.0	91-98	Dry	Slightly Moist
1 + 00	0.1.0	0.0-0.5	1.0-3.0	90-96	Dry	Slightly Moist
2 + 00	0-1.0	0.4-1.6	1.5-3.0	87-97	Dry	Slightly Moist
3 + 00	0-1.5	0.6-2.0	1.5-3.0	88-96	Dry	Slightly Moist
4 + 00	0-1.0	1.0-3.0	1.0-3.0	87-95	Dry	Slightly Moist
5 + 00	0-1.2	1.0-2.7	1.0-4.0	82-98	Dry	Slightly Moist
10 + 00	0-0.5	1.3-1.8	3.0-4.0	98	Dry	Slightly Moist
11 + 00	0-0.5	1.1-1.7	1.0-3.0	92	Dry	Slightly Moist
12 + 00	0-0.5	1.0-2.0	1.0-3.0	95	Dry	Slightly Moist
13 + 00	0-0.5	2.0-2.4	2.5-2.9	88-97	Dry	Slgihtly Moist
14 + 00	0-0.5	1.0-3.0	2.0-4.0	91-98	Dry	Slightly Moist
Slope No.			B. Prepared Slopes			
1	0-0.5	1.5-3.0	2.6-3.2	95-97	Dry	Moist
2	0-0.5	0.8-2.2	2.1-2.7	95-96	Dry	Moist
3	0-0.5	1.3-2.4	2.2-2.9	96-97	Dry	Moist
4	0-0.5	1.7-2.8	2.6-4.6	96	Dry	Moist
5	0-0.5	1.0-2.2	2.4-4.0	95-96	Dry	Moist
8	0-0.5	2.5-3.0	3.3-	–	Dry	Moist
9	0-0.5	1.5-2.7	1.9-3.1	95	Dry	Moist

1973 Grain Size Distribution

Grain Size Distribution (Average Values)

Depth (in.)	Percent Fines by Weight for U.S. Standard Sieve Numbers					
	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
		A. Station 0 + 00 thru 6 + 00				
1 to 3	99.7	94.3	50.0	4.8	0.4	0.2
6 to 9	99.7	94.6	52.2	5.4	0.5	0.2
		B. Station 10 + 00 thru 14 + 00				
1 to 3	98.6	90.3	54.8	10.8	0.8	0.2
6 to 9	99.1	89.7	47.4	8.1	0.6	0.2

1974 Soil Moisture and Density Data

Slope No.	Moisture Content (%)		Density (lbf/ft^3)	
	0-3 in.	6-9 in.	0-3 in.	6-9 in.
1	2.3-2.9	2.8-3.2	92-97	91-96
2	1.8-3.2	2.9-3.7	89-97	91-96
3	2.2-2.7	3.0	91-96	95-96
4	1.6	2.7-3.1	90-95	94-95
5	2.2	3.0	93	93
8	1.1-3.9	2.8-3.9	90-99	91-96
9	1.3-3.4	2.2-3.5	91-100	93-103
10	1.1-3.1	1.7-3.5	88-96	89-97

1974 Grain Size Distribution

(Average Value 0- to 9-Inch Depth, Slopes 1-10)

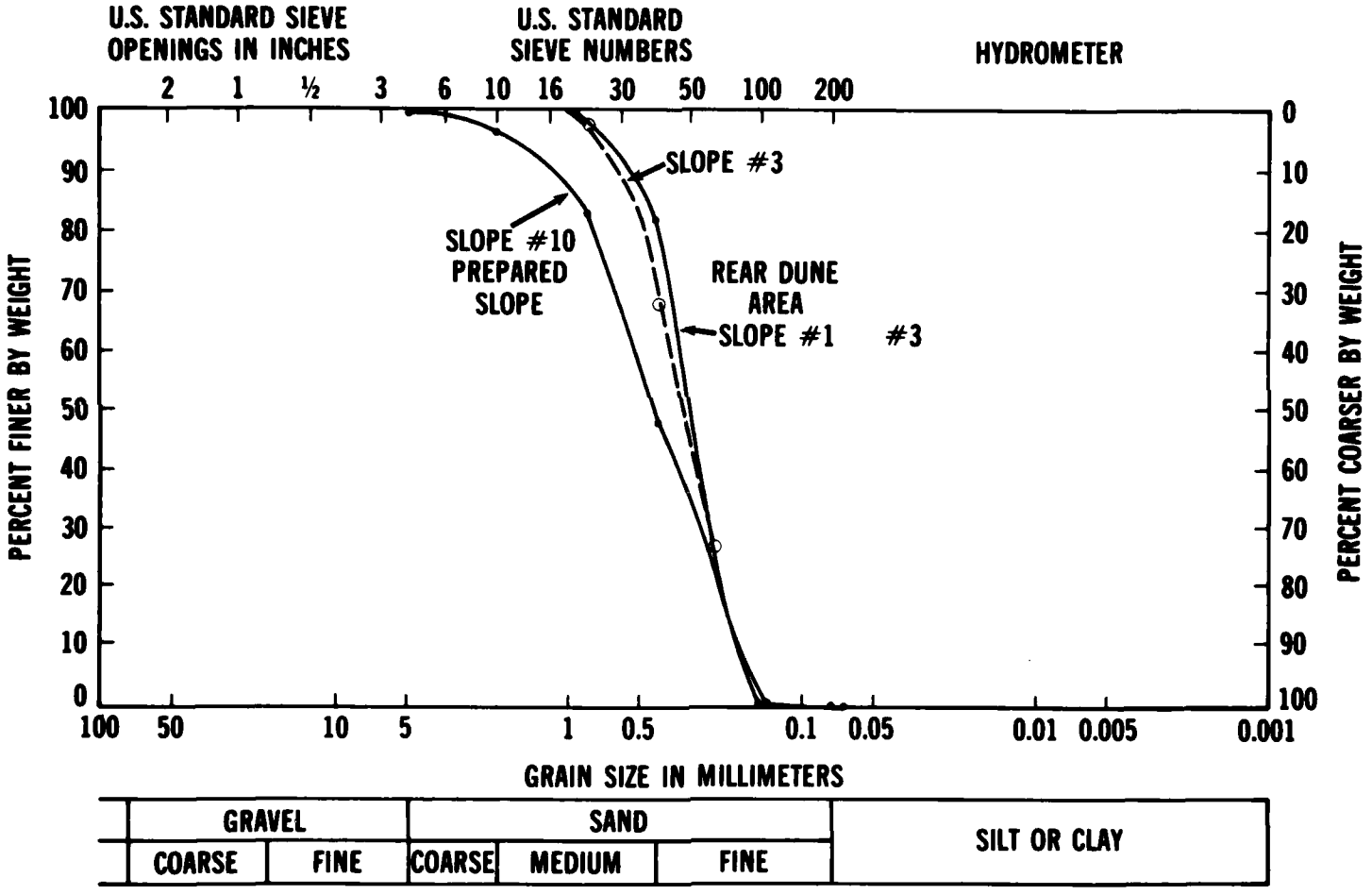
Percent Fines by Weight for U.S. Standard Sieve Numbers

	Sieve Number					
	10	20	40	60	100	200
Percent Fines	98.8	90.3	49.2	12.6	0.75	0.25

Soil Moisture, Density, and Grain Size Distribution

1977 Soil Data

Date	STA	Dune	Vehicle	Moisture (%) 0-3"	Moisture (%) 6-9"	Dry Density (lbf/ft^3) 0-3"	Dry Density (lbf/ft^3) 6-9"
5 Oct 77	0+20	1-rear area	Le Tro Porter	2.2	2.4	93.8	97.7
5 Oct 77	0+20	2-rear area	"	–	2.1	–	100.0
5 Oct 77	0+42.5	1-rear area	"	1.0	3.1	94.1	90.9
5 Oct 77	0+37.5	3-rear area	"	1.0	3.6	96.0	98.4
6 Oct 77	0+55	3-rear area	"	–	1.3	99.4	94.4
6 Oct 77	0+35	3-rear area	"	0.4	2.3	94.2	94.7
6 Oct 77	0+89	10	"	1.02	2.4	95.9	101.7
6 Oct 77	1+15	10	"	1.7	1.1	95.8	94.8
9 Oct 77	0+75	9	"	1.5	2.3	94.1	98.4
9 Oct 77	0+65	9	"	3.2	3.2	92.8	95.8
11 Oct 77	0+48	9	"	3.0	2.6	93.1	100.0
12 Oct 77	0+52	9	"	5.5	2.9	93.9	97.5
12 Oct 77	0+65	10	"	5.5	3.6	93.2	99.2
17 Oct 77	0+60	10	"	3.5	3.2	92.0	96.8
17 Oct 77	0+40	9	Clark	2.4	3.7	91.9	99.5
18 Oct 77	0+52.5	9	"	3.5	3.5	94.9	100.3
18 Oct 77	0+78	10	"	3.3	3.8	91.2	99.1
18 Oct 77	0+58	10	"	2.9	3.3	90.7	98.4
18 Oct 77	0+42	9	"	2.6	3.5	95.0	98.0
19 Oct 77	0+59	9	"	2.2	3.1	96.8	98.0
19 Oct 77	0+79	10	"	2.1	3.8	97.0	99.1
19 Oct 77	0+58	9	"	1.7	2.7	96.2	101.4
19 Oct 77	0+68	10	"	2.1	3.0	95.1	100.0
20 Oct 77	0+64	9	"	2.9	3.0	94.7	105.7
20 Oct 77	0+65	9	"	2.0	3.1	93.8	96.1
21 Oct 77	0+74	10	"	2.5	4.4	91.7	98.9
21 Oct 77	0+52	9	"	1.9	2.2	92.6	98.0
25 Oct 77	0+87	9	"	2.1	1.7	90.9	96.0
25 Oct 77	0+69	10	"	2.8	2.1	91.1	94.0
27 Oct 77	0+62	10	Le Tro Porter	3.8	4.1	90.9	96.4
27 Oct 77	0+52	9	"	3.3	3.8	92.1	99.3


U.S. STANDARD SIEVE OPENINGS IN INCHES
U.S. STANDARD SIEVE NUMBERS
HYDROMETER
2 1 ½ 3 6 10 16 30 50 100 200
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
PERCENT FINER BY WEIGHT
PERCENT COARSER BY WEIGHT
SLOPE #3
SLOPE #10 PREPARED SLOPE
REAR DUNE AREA
SLOPE #1 #3
100 50 10 5 1 0.5 0.1 0.05 0.01 0.005 0.001
GRAIN SIZE IN MILLIMETERS
GRAVEL
COARSE FINE
SAND
COARSE MEDIUM FINE
SILT OR CLAY

APPENDIX B

FLOTATION INDEX VALUES

FOR

ALL 50-k RTCHs TESTED

Flotation Index Values

Vehicle	Tire Size	Ply	Bias/ Radial	Load	GVW	AL_F	AL_R	TP_F	TP_R	FI
Cat 824B	29.5x29	40	Bias	0	110,350	44,700	65,650	90	62	104.6
								62	35	59.3
								50	35	54.5
				50	160,400	133,000	27,400	50	35	76.95
								62	35	83.75
								90	62	157.4
			Radial	0	110,350	44,700	65,650	90	62	47.9
								62	35	27.2
				50	160,400	133,000	27,400	90	62	47.0
								62	35	26.6
Clark 475	37.5x39	44	Radial	0	173,600	98,960	74,640	85	50	37.6
								65	30	24.3
				50	226,720	186,140	40,580	85	50	37.4
								65	30	24.2
			Bias	0	173,600	98,960	74,640	85	50	140.8
								65	30	91.1
				50	226,720	186,140	40,580	85	50	220.1
								65	30	142.7
	37.25x35	36	Bias	0	173,600	98,960	74,640	65	30	88.1
				50	226,720	186,140	40,580	65	30	138.1
Marathon LeTourneau	32.9x35	36	Radial	0	123,970	86,226	37,744	63	30	23.1
								75	30	25.4
								75	40	29.3
								85	40	31.8
								85	50	36.3
				50	173,970	153,559	20,411	63	30	22.6
								75	30	24.9
								75	40	28.7
								85	40	31.1
								85	50	35.5
Cat 988	36.2x33	36	Radial	0	114,000	52,300	61,700	70	28	24.3
								85	50	37.4
					118,000	59,800	48,000	70	28	23.8
								85	50	36.7

Flotation Index Values

(Cont'd)

Vehicle	Tire Size	Ply	Radial	Load	GVW	AL_F	AL_R	TP_F	TP_R	FI
Cat 988B				50	164,000	135,800	28,200	70	28	24.7
								85	50	34.9
					168,000	143,000	25,000	70	28	22.6
								85	50	27.2
				0	114,000			90	62	45.3
								62	35	25.3
					118,000			90	62	44.5
								62	35	24.9
				50	164,000			90	62	44.9
								62	35	23.4
					168,000			90	62	42.2
								62	35	23.6

APPENDIX C

CLARK 50-k RTCH

MASTER DATA SHEETS

PERFORMANCE CURVES

COMPARISON OF ACTUAL AND PREDICTED PERFORMANCE

Clark 50-K RTCH

Load	TP_F	TP_R	Average Cone Index Readings					CI Avg			% S	Dune	Run #	Date
			SFC	3"	6"	9"	12"	0-6"	0-9"	0-12"				
0	85	50	12	93	219	382	498	108	177	241	14.3	10	10	6/7/78
			13	79	207	425	567	100	181	258	15.2	10	14	
			13	82	228	436	567	108	190	265	15.2	10	16	
			13	104	251	621	558	123	247	310	15.4	10	17	
			13	71	168	333	435	84	146	204	15.5	10	18	
50K			14	78	166	254	313	86	128	165	14.3	10	26	6/8/78
			13	84	187	290	365	95	143	188	17.8	9	51	6/13/78
			8	46	105	198	504	53	89	172	15.4	9	53	
50K	85	40	13	104	216	305	538	111	159	235	13.7	10	64	6/14/78
			13	99	219	343	468	110	169	228	17.3	9	65	
			14	129	242	333	449	128	179	233	15.7	10	66	
			13	88	175	296	438	92	143	202	17.2	9	67	
0			19	114	206	326	422	133	166	217	18.8	9	68	
			13	112	218	320	413	114	166	215	19.4	9	69	
			19	138	277	394	458	145	207	257	18.9	9	70	
			19	120	228	341	429	122	177	227	18.8	9	71	
50K	80	40	19	136	256	293	488	137	176	238	16.9	9	72	
			16	117	246	385	465	126	191	246	17.5	9	73	
			16	94	200	314	399	104	156	205	17.2	9	74	
			13	64	136	238	349	71	113	160	16.5	9	75	
0			13	74	127	179	215	71	98	122	16.8	10	76	
			13	90	171	232	281	91	126	157	14.7	10	77	
			13	105	182	259	333	100	140	178	14.9	10	78	
			14	101	209	306	374	108	158	201	18.8	9	79	

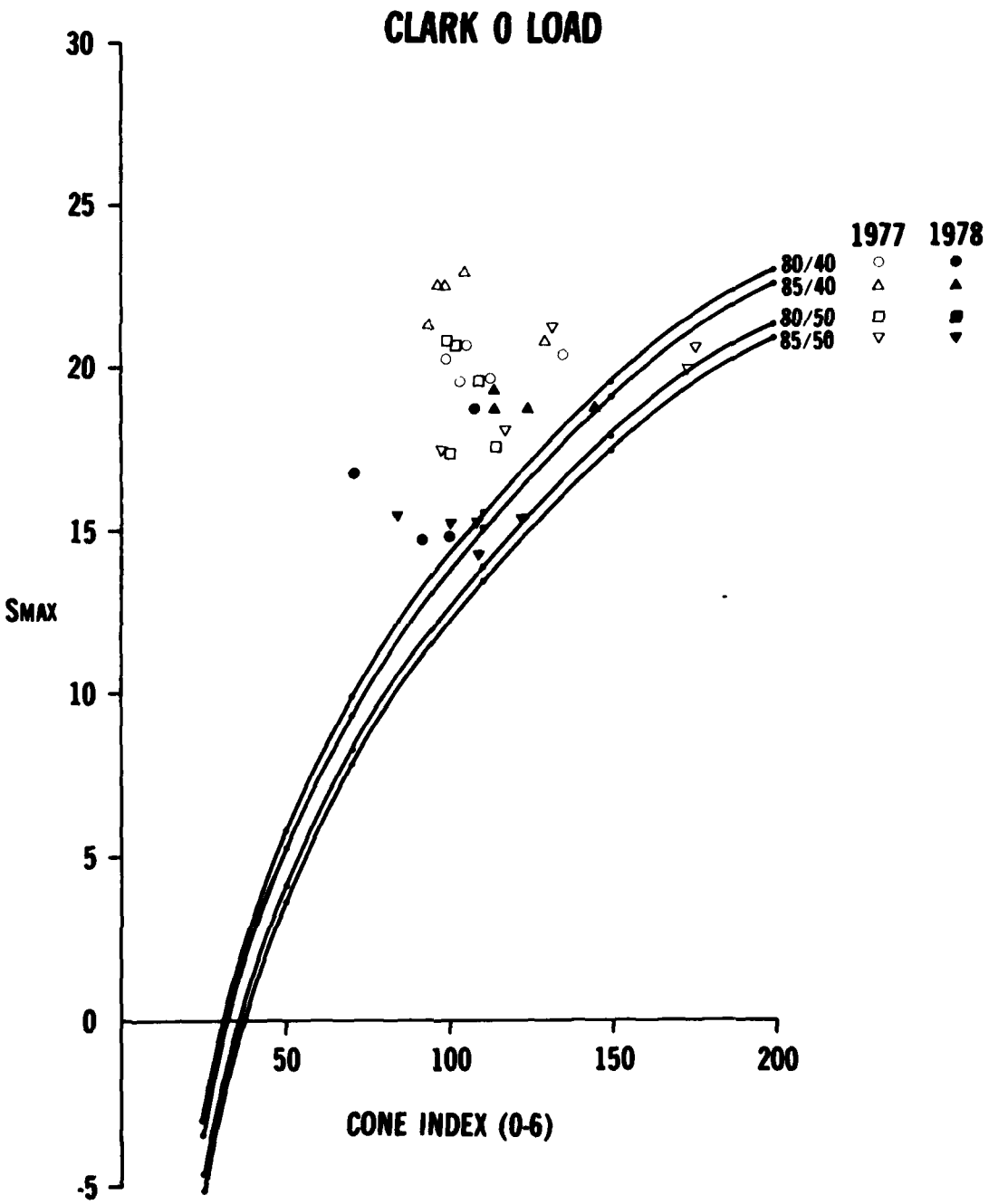
Clark 50-K RTCH

(Cont'd)

Load	TP_F	TP_R	Average Cone Index Readings					CI Avg			% S	Dune	Run #	Date
			SFC	3"	6"	9"	12"	0-6"	0-9"	0-12"				
0	75	40	13	104	190	274	333	102	145	183	20.2	9	80	6/14/78
50K	75	40	20	140	229	329	440	130	180	232	14.0	10	81	
0			19	108	198	262	333	108	146	184	20.2	9	82	
50K			21	118	193	257	346	110	147	187	14.6	10	83	
0			24	124	219	313	402	122	170	216	17.5	9	84	
50K			24	148	239	359	515	137	193	257	15.4	10	85	
0			25	137	262	352	409	141	194	237	18.7	9	86	
50K			12	120	226	313	379	119	168	210	17.1	9	87	6/15/78
50K	70	40	17	92	172	269	426	93	137	195	17.7	10	88	
			19	138	244	329	403	134	182	227	17.3	9	89	
			18	102	174	303	484	98	149	216	17.8	10	90	
			22	158	278	352	406	153	202	243	19.0	9	91	
0			25	122	206	322	434	118	169	222	16.8	10	92	
			25	137	241	336	424	134	185	233	19.6	9	93	
			20	140	253	359	460	138	193	246	18.0	9	94	
			25	131	242	364	481	133	190	249	20.3	9	95	
50K	65	40	24	119	222	326	425	122	173	223	18.3	9	96	
			22	99	181	273	385	101	144	192	19.2	9	97	
			19	76	144	241	362	80	120	168	20.1	10	98	
			25	112	217	341	450	118	174	229	17.8	9	99	
0			19	94	172	265	364	95	137	183	22.7	10	106	
			25	102	192	327	476	106	161	224	21.1	10	107	
			25	125	248	369	525	133	192	258	21.5	10	108	
			25	115	229	387	553	123	189	262	20.2	10	109	

Clark 50-K RTCH
(Cont'd)

Load	TP_F	TP_R	Average Cone Index Readings					CI Avg			% S	Dune	Run #	Date
			SFC	3"	6"	9"	12"	0-6"	0-9"	0-12"				
0	65	30	25	129	258	419	581	137	208	282	21.3	10	110	6/15/78
↓	↓	↓	19	107	228	351	484	118	176	238	23.8	10	111	6/16/78
0	↓	↓	19	106	216	343	485	114	171	234	21.7	10	112	↓
↓	↓	↓	19	102	202	330	476	106	163	226	21.0	10	113	↓
50K	↓	↓	21	91	189	306	444	100	152	210	19.3	10	114	↓
↓	↓	↓	25	111	221	360	514	119	179	246	18.7	10	115	↓
↓	↓	↓	23	115	232	366	511	123	184	249	19.0	10	116	↓
↓	↓	↓	25	134	276	442	581	145	214	288	18.0	10	117	↓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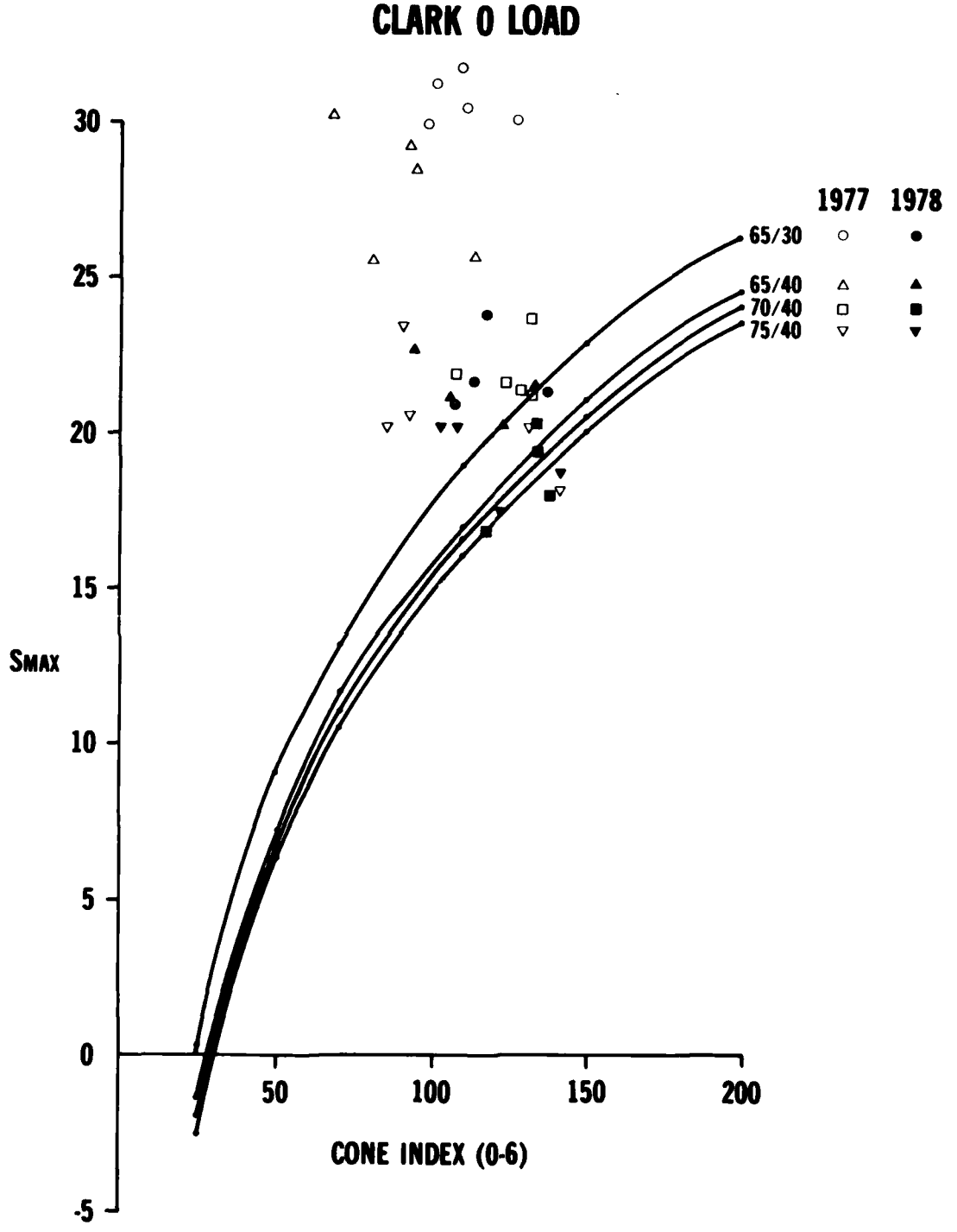
30
25
20
15
10
5
0
-5
SMAX
50
100
150
200
CONE INDEX (0-6)
1977
1978
80/40
85/40
80/50
85/50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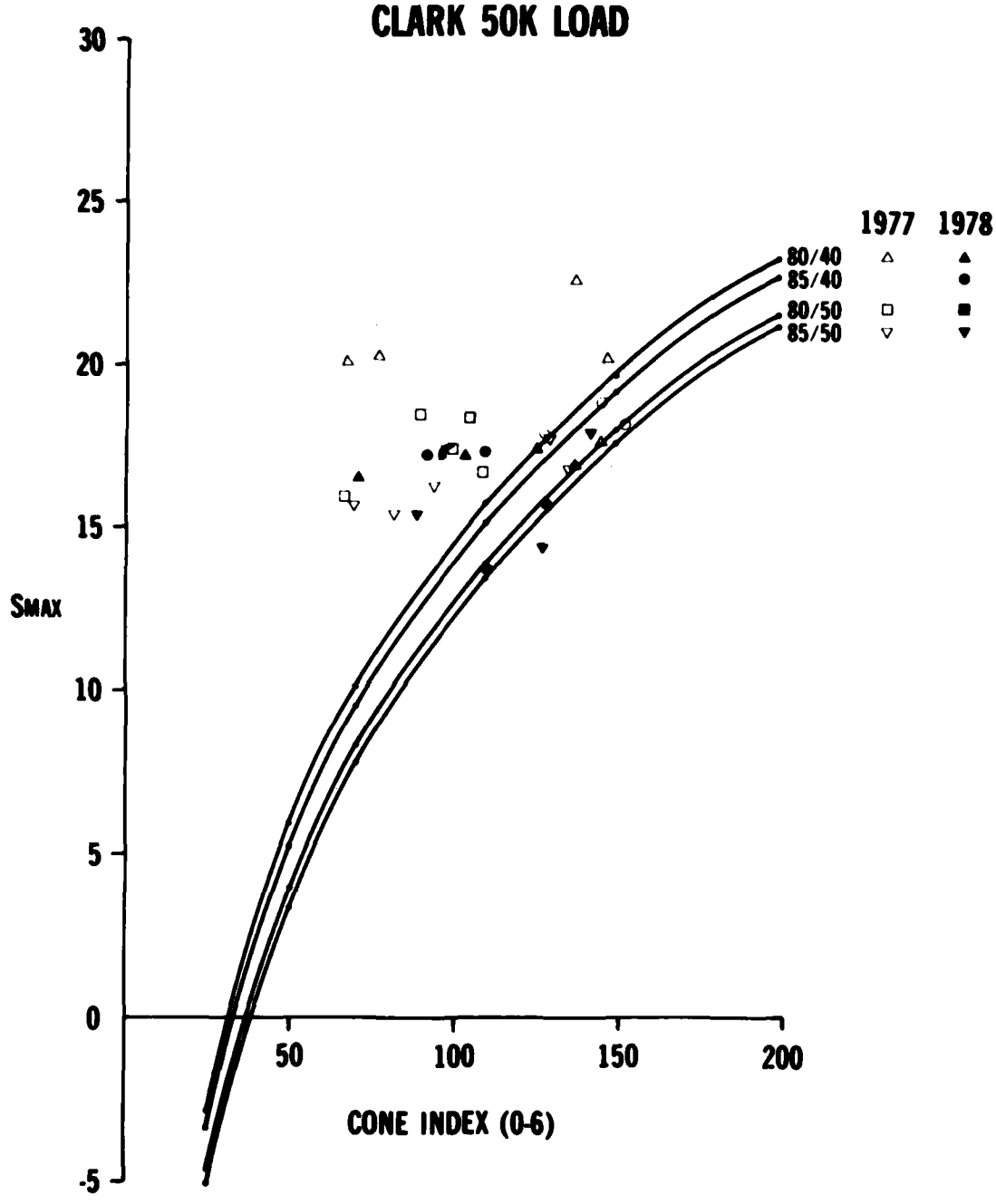
30
25
20
15
10
5
0
-5
SMAX
50
100
150
200
CONE INDEX (0-6)
1977
1978
65/30
65/40
70/40
75/40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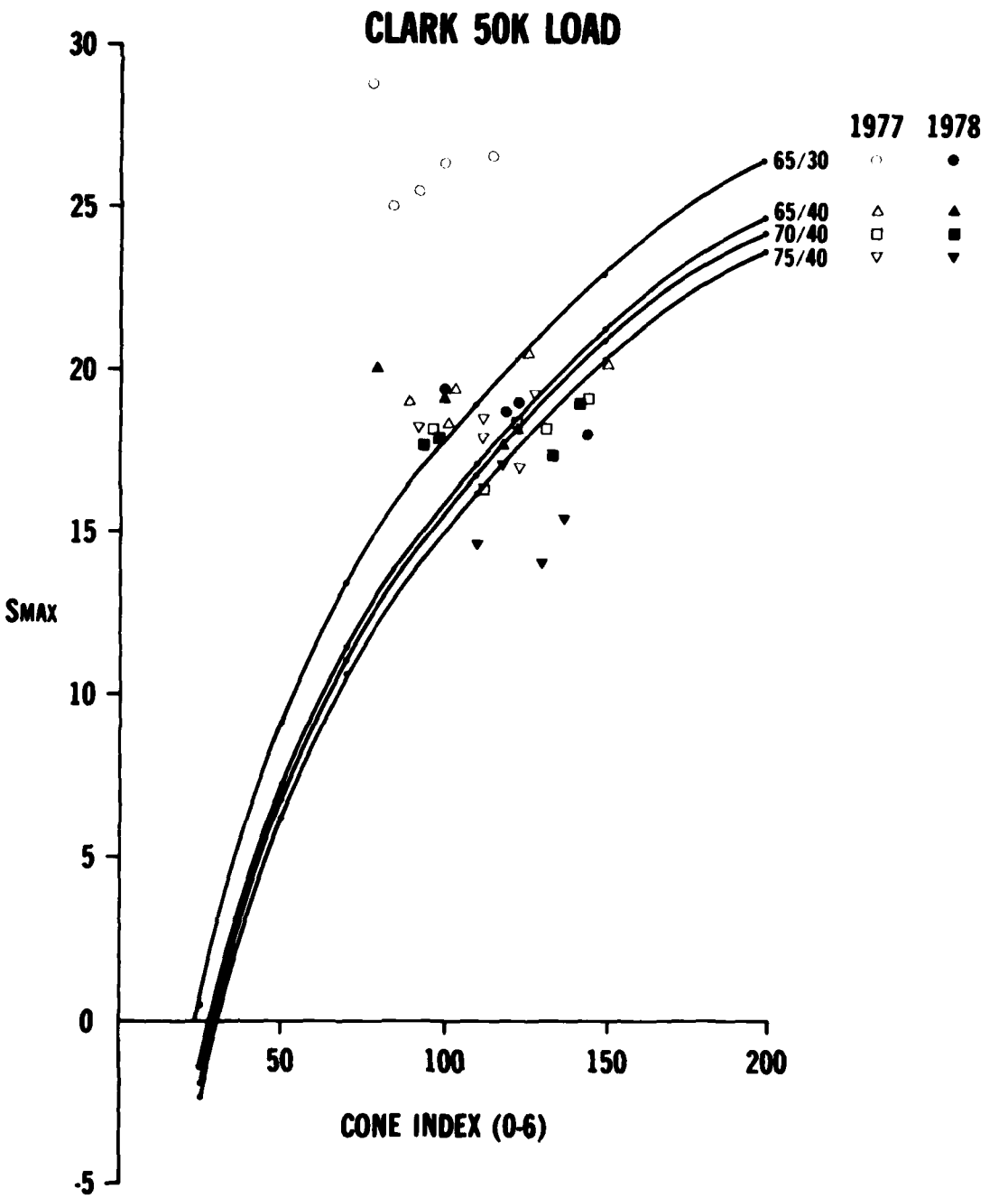
30
25
20
15
10
5
0
-5
SMAX
50
100
150
200
CONE INDEX (0-6)
1977
1978
80/40
85/40
80/50
85/50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1977
1978
65/30
65/40
70/40
75/40
SMAX
30
25
20
15
10
5
0
-5
50
100
150
200
CONE INDEX (0-6)

Clark 50K Jun 78

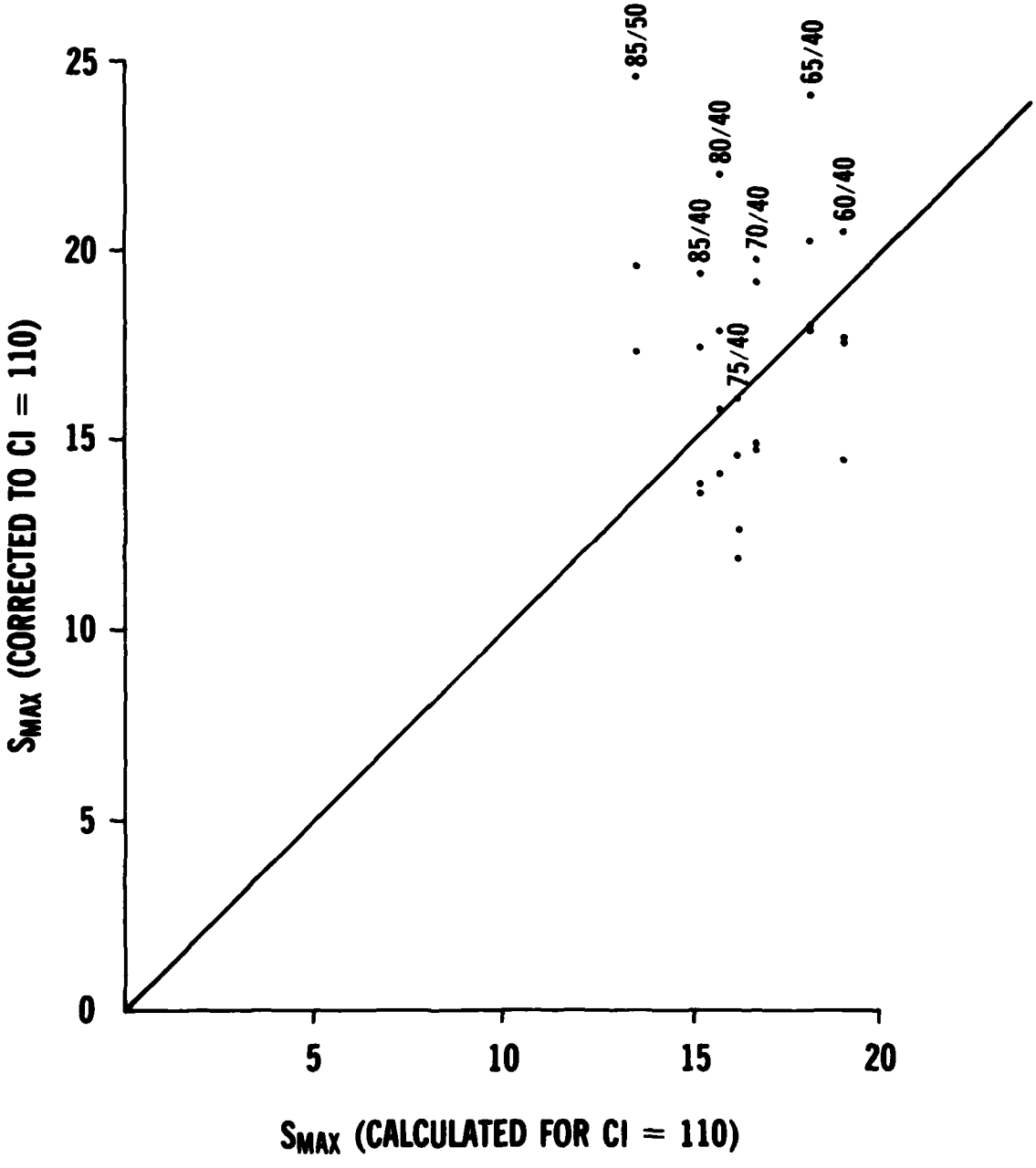
Cl_{0-6} Avg	Data % S	Data % S for CI=110	Calc % S for CI=110	TP_F/TP_R	Load
108	14.3	14.5	13.5	85/50	0
100	15.2	16.4			
108	15.2	15.4			
123	15.4	13.99			
84	15.5	18.9			
86	14.3	17.4	13.5		50
95	17.8	19.6			
53	15.4	24.6			
111	13.7	13.6	15.2	85/40	50
110	17.3	17.3			
128	15.7	13.8			
92	17.2	19.4			
113	18.8	18.5	15.1		0
114	19.4	18.95			
145	18.9	15.4			
122	18.8	17.5			
137	16.9	14.1	15.7	80/40	50
126	17.5	15.8			
104	17.2	17.9			
71	16.5	22.0			
71	16.8	22.3	15.6		0
91	14.7	17.1			
100	14.9	16.1			
108	18.8	19.0			
102	20.2	21.1	16.1	75/40	0
130	14.0	11.9	16.2		50
108	20.2	20.4	16.1		0
110	14.6	14.6	16.2		50
122	17.5	16.2	16.1		0
137	15.4	12.6	16.2		50
141	18.7	15.6	16.1		0
119	17.1	16.1	16.2		50
93	17.7	19.8	16.7	70/40	50
134	17.3	14.8			
98	17.8	19.2			
153	19.0	14.9			
118	16.8	15.9	16.6		0
134	19.6	17.1			
138	18.0	15.2			

Clark 50K Jun 78

(Cont'd)

$CI_{0.6}$ Avg	Data % S	Data % S for CI=110	Calc % S for CI=110	TP_F/TP_R						
133	20.3	17.9		70/40	0					
122	18.3	17.0	17.1	65/40	50					
101	19.2	20.2								
80	20.1	24.1								
118	17.8	16.9								
95	22.7	24.5	17.1		0					
106	21.1	21.6								
133	21.5	19.1								
123	20.2	18.8								
137	21.3	18.5	18.9	65/30	0					
118	23.8	22.9								
114	21.7	21.3								
106	21.0	21.5								
100	19.3	20.5	19.0		50					
119	18.7	17.7								
123	19.0	17.6								
145	18.0	14.5								

CLARK 50K LOAD
JUN 78



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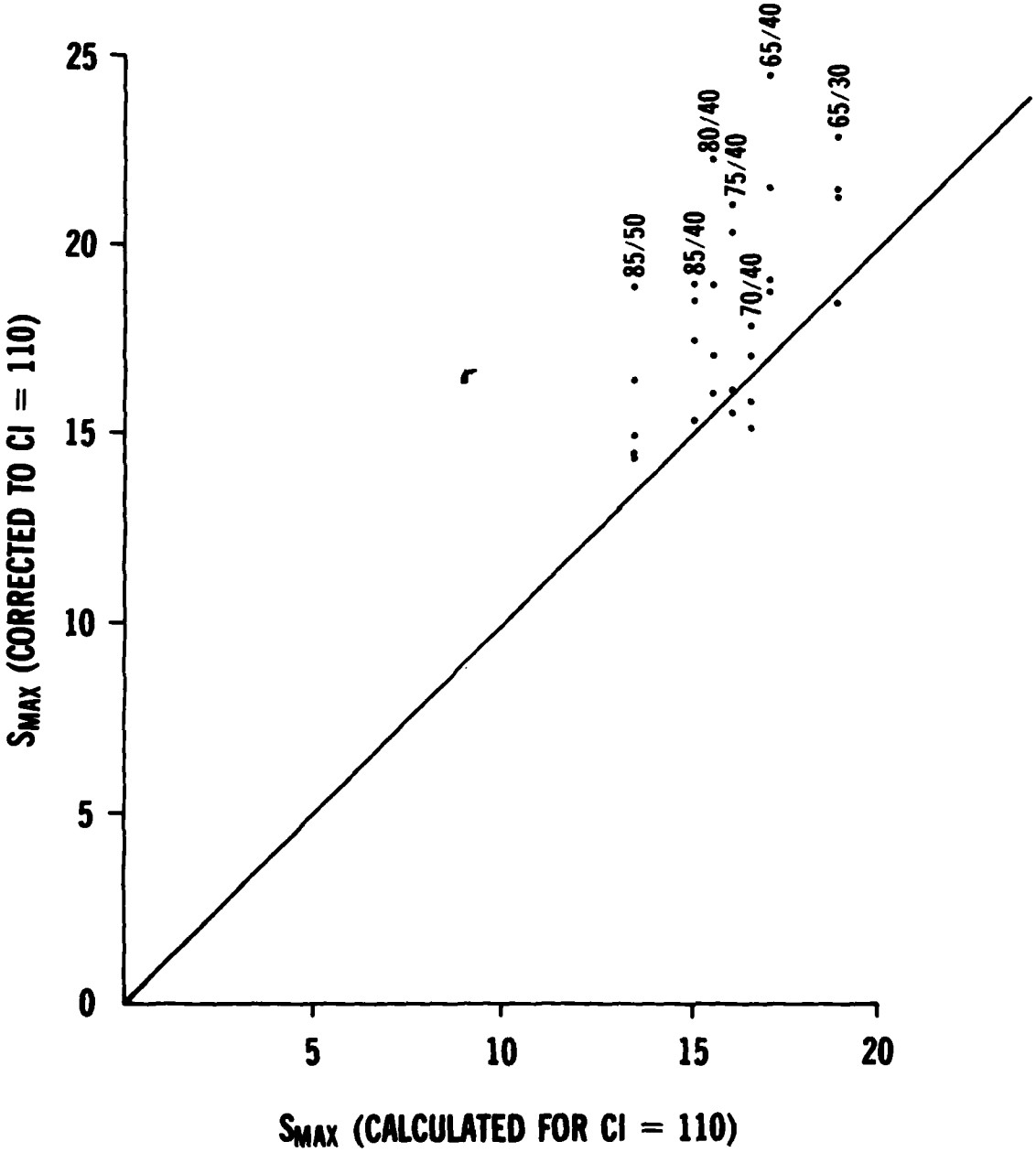
JUN 78



APPENDIX D

CATERPILLAR 50-k RTCH

MASTER DATA SHEETS

PERFORMANCE CURVES

COMPARISON OF ACTUAL AND PREDICTED PERFORMANCE

Caterpillar 50-K RTCH

Normal Tread

Load	TP_F	TP_R	Average Cone Index Readings					CI Avg			% S	Dune	Run #	Date
			SFC	3"	6"	9"	12"	0-6"	0-9"	0-12"				
50K	90	55	13	98	198	294	426	103	151	206	10.3	10	1	6/28/78
			12	74	161	325	554	82	143	225	14.1	9	2	
			13	80	146	295	636	79	133	214	14.8	9	3	
			7	87	211	330	652	101	160	259	9.3	4	4	
0			13	73	148	294	449	78	132	195	16.2	10	5	
			12	69	168	291	479	83	135	204	12.6	9	6	
			20	86	174	299	487	93	145	213	17.6	10	7	
			13	96	204	319	493	104	158	225	16.1	10	8	
0	80	55	16	123	243	417	596	127	200	279	13.4	9	9	
			20	154	314	514	703	163	250	341	13.8	9	10	
			22	113	281	473	637	139	222	305	13.6	9	11	
			23	96	171	274	439	97	141	201	16.4	10	12	
50K			25	138	301	516	677	154	245	331	11.9	9	13	
			21	110	206	314	459	112	163	222	11.2	10	14	
			25	133	280	499	645	146	234	316	11.9	9	15	
			19	75	147	264	411	80	126	183	10.4	10	16	
50K	75	55	25	141	324	524	688	163	253	340	12.0	9	17	
			20	69	111	176	298	67	94	135	9.5	3	18	
			18	83	178	306	453	93	146	207	12.0	10	19	
			24	96	180	309	452	100	152	212	9.1	3	20	
0			24	108	272	481	635	135	221	304	14.1	9	21	
			25	101	233	436	652	120	199	289	18.0	10	22	
			21	88	239	430	604	116	194	345	13.7	9	23	
			24	103	243	424	669	123	198	292	17.7	10	24	

Caterpillar 50-K RTCH (Cont'd)

Normal Tread

Load	TP_F	TP_R	Average Cone Index Readings					CI Avg			% S	Dune	Run #	Date
			SFC	3"	6"	9"	12"	0-6"	0-9"	0-12"				
50K	65	55	25	125	314	526	706	155	247	339	17.5	10	25	6/29/78
			22	96	223	366	463	113	177	234	13.1	9	26	
			22	91	184	359	571	99	164	245	15.8	10	27	
			25	114	252	404	493	130	199	258	13.3	9	28	
0			24	97	242	439	662	121	201	293	17.0	10	29	
			25	141	302	470	595	109	199	278	13.9	9	30	
			25	126	276	456	608	142	221	298	13.8	9	31	
			15	76	196	378	611	96	166	255	17.6	10	32	
0	65	50	24	113	251	405	519	129	198	262	13.1	9	33	
			25	117	287	502	701	143	233	326	18.2	10	34	
			25	142	314	459	608	160	235	310	13.7	9	35	
			24	103	236	441	673	121	201	295	17.6	10	36	
50K			25	160	361	507	627	182	263	336	13.2	9	37	
			25	125	311	539	762	154	250	352	14.9	10	38	
			25	106	242	419	558	124	198	270	12.2	9	39	
			23	80	186	367	596	96	164	250	16.7	10	40	
50K	65	45	25	140	339	503	619	168	252	325	11.9	9	41	
			22	39	196	407	581	86	166	249	16.4	10	42	
			24	85	220	356	476	110	171	232	13.3	10	43	
			13	62	151	357	566	75	146	230	16.0	10	44	
0			25	107	251	389	509	128	193	256	14.8	9	45	
			24	89	196	380	587	103	172	255	19.3	10	46	
			25	131	267	384	452	141	202	252	15.8	9	47	
			21	81	202	410	598	101	178	262	19.1	10	48	

Caterpillar 50-K RTCH (Cont'd)

Normal Tread

Load	TP_F	TP_R	Average Cone Index Readings					CI Avg			% S	Dune	Run #	Date
			SFC	3"	6"	9"	12"	0-6"	0-9"	0-12"				
50K	60	45	17	91	190	274	322	99	143	179	14.7	9	49	6/29/78
			25	99	247	484	680	124	214	307	16.6	10	50	
			25	105	269	491	684	133	222	315	16.2	10	51	
			25	107	287	530	710	140	237	332	16.5	10	52	
0			26	138	367	587	729	177	279	369	18.7	10	53	
			25	113	277	517	708	138	233	328	18.9	10	54	
			25	127	301	481	641	151	233	315	21.4	10	55	
			25	132	332	542	697	163	258	346	19.9	10	56	

Caterpillar 50-K RTCH

Deep Tread

Load	TP_F	TP_R	Average Cone Index Readings					CI Avg			% S	Dune	Run #	Date
			SFC	3"	6"	9"	12"	0-6"	0-9"	0-12"				
0	90	55	13	96	213	345	421	107	168	217	7.8	10	1	6/6/78
			12	76	173	338	456	87	150	211	6.2	10	2	
			14	116	269	424	615	133	206	288	7.4	10	3	
			13	98	224	386	545	112	180	253	7.0	10	4	
			13	108	237	434	590	119	198	276	7.6	10	5	
50K			10	73	208	507	755	97	200	311	6.6	3	6	6/7/78
50K	80	55	12	100	288	573	735	134	244	342	5.5	3	7	
0			13	89	241	507	698	114	212	309	11.4	3	8	
			11	91	237	500	676	113	210	303	15.5	3	9	
			13	88	244	478	688	115	206	302	13.2	3	11	
			9	87	258	519	686	118	218	319	11.3	3	12	
			9	96	279	499	675	128	221	312	8.9	3	13	
0	75	55	13	79	198	390	853	97	170	306	8.5	3	15	
			15	101	260	512	698	128	224	319	10.4	3	19	6/8/78
			13	58	133	261	389	68	116	171	11.2	10	20	
			13	92	212	418	543	105	184	255	9.1	10	21	
			13	123	278	534	716	138	231	333	10.6	3	22	
50K			13	94	242	563	633	116	228	309	6.2	3	23	
			13	116	318	544	684	149	247	335	7.1	10	24	
			28	121	271	545	646	140	241	322	6.2	3	25	
0	65	55	18	123	298	525	723	146	241	337	11.1	3	27	
			13	86	216	437	620	105	188	274	8.7	10	28	6/12/78
			15	123	228	396	695	122	191	291	9.7	3	29	
			13	71	132	247	362	72	116	165	10.9	10	30	

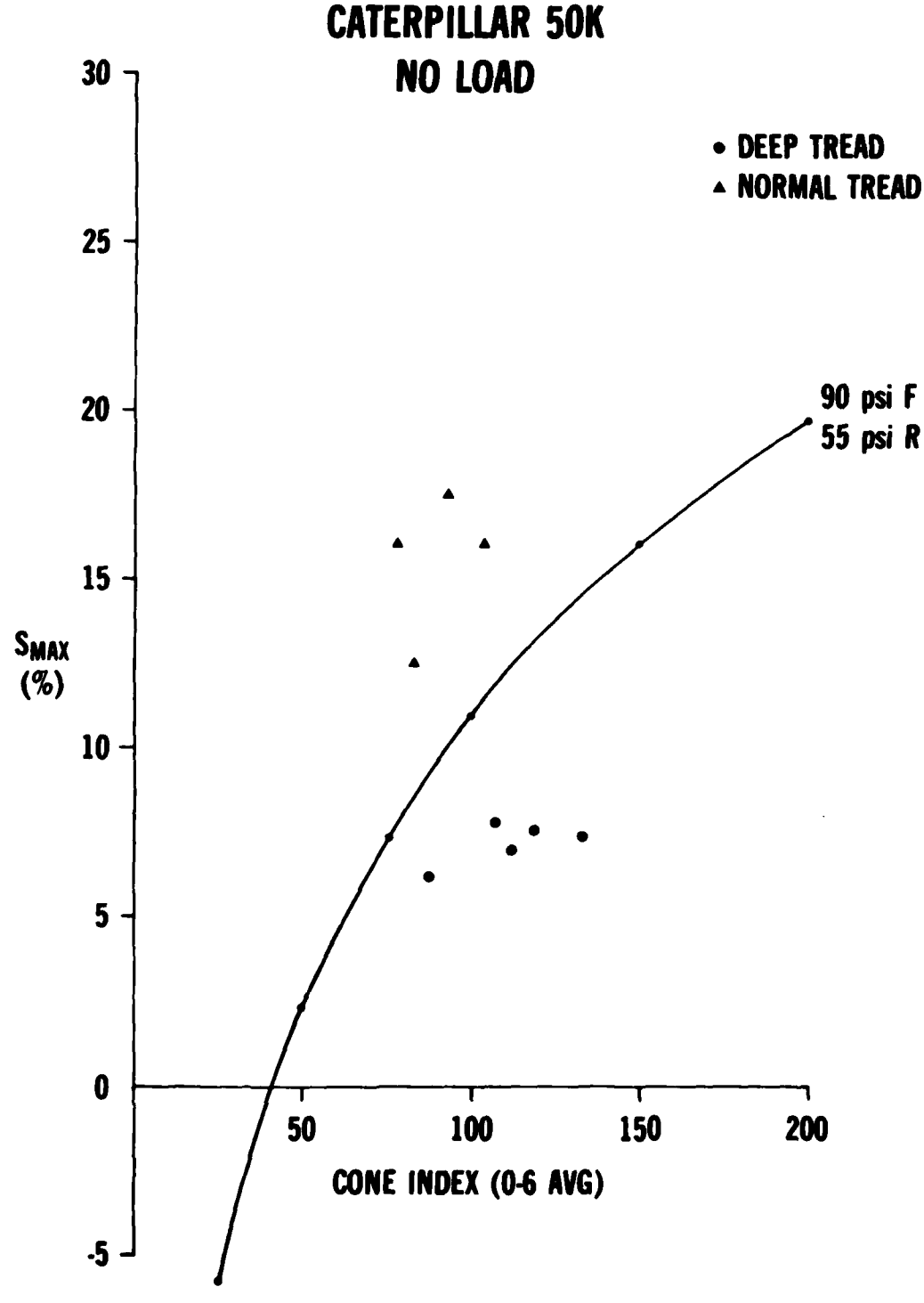
Deep Tread

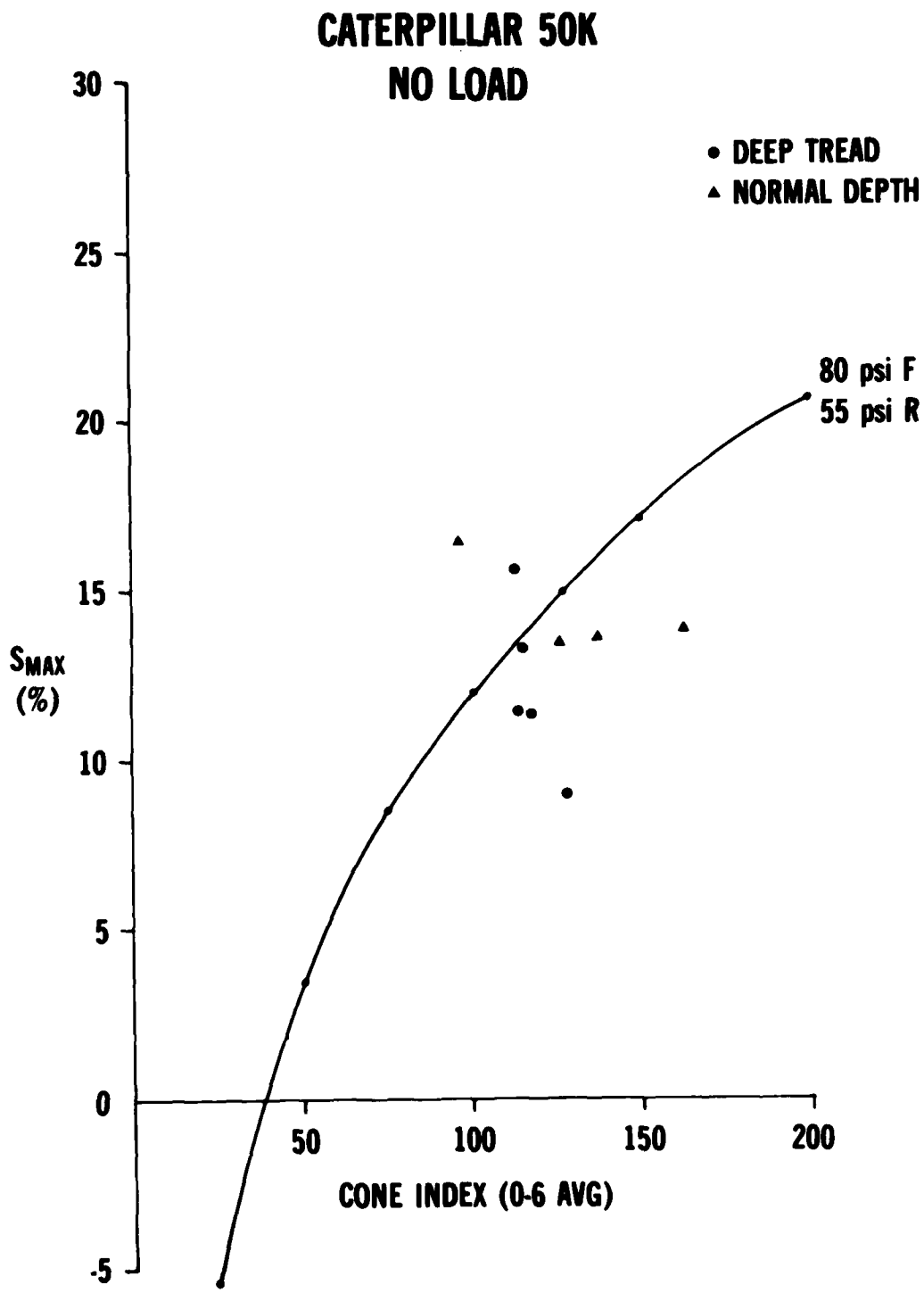
Load	TP_E	TP_R	Average Cone Index Readings					CI Avg			% S	Dune	Run #	Date
			SFC	3"	6"	9"	12"	0-6"	0-9"	0-12"				
0	65	55	13	130	328	644	793	157	278	382	13.3	3	31	6/12/78
50K	65	55	13	76	140	279	444	76	127	190	7.5	10	32	6/12/78
			13	119	280	521	673	137	233	321	11.4	3	33	
			13	87	168	356	547	89	156	234	7.9	10	34	
			13	131	323	583	701	155	262	350	11.0	3	35	
			13	84	179	403	596	92	170	255	7.6	10	36	
50K	65	50	13	94	202	444	608	103	188	272	7.0	10	37	
			13	139	329	580	710	160	265	354	10.4	3	38	
			13	70	153	339	526	79	144	220	7.9	10	39	
			13	88	220	475	626	107	199	284	10.4	3	40	
			13	79	176	373	538	89	160	236	8.3	3	41	
0			7	73	186	400	566	89	166	246	12.9	3	42	
			12	75	214	434	606	101	184	268	9.7	10	43	
			13	93	253	517	708	120	219	317	8.2	3	44	
			13	86	223	458	623	107	135	281	9.6	3	45	
			13	97	218	423	563	109	188	262	9.7	10	46	
			13	95	228	412	553	112	187	260	9.2	10	47	6/13/78
0	65	45	13	68	140	200	283	73	105	141	6.0	3	48	
			13	101	218	365	553	110	174	250	8.2	10	49	
			13	126	271	405	558	136	203	275	9.4	3	50	
			13	118	262	430	610	131	206	288	8.3	10	51	
			12	119	253	419	604	128	201	281	8.7	3	54	
50K			12	74	168	290	499	85	136	209	7.1	10	55	
			12	71	174	326	538	86	146	224	7.6	10	56	

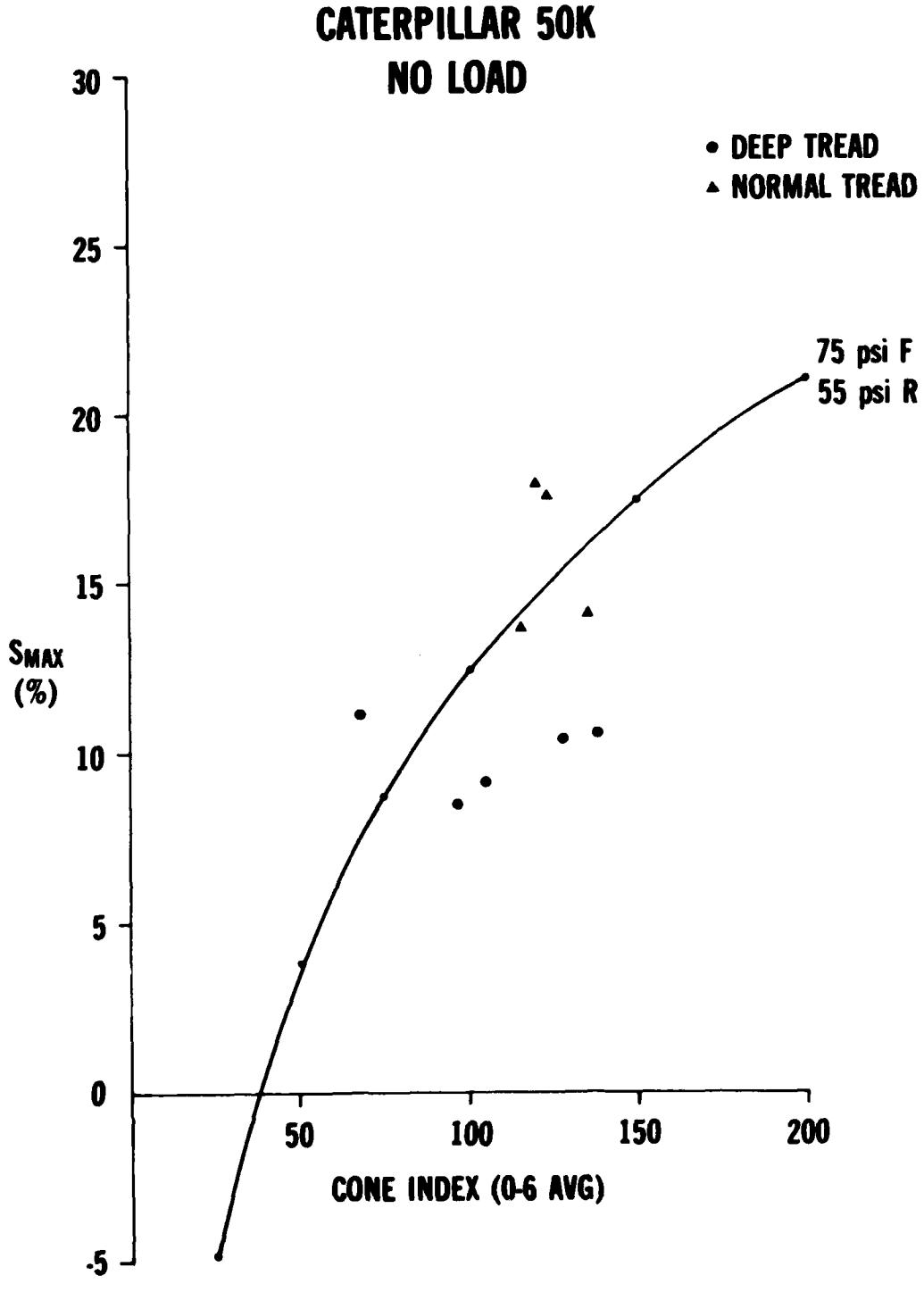
Caterpillar 50-K RTCH (Cont'd)

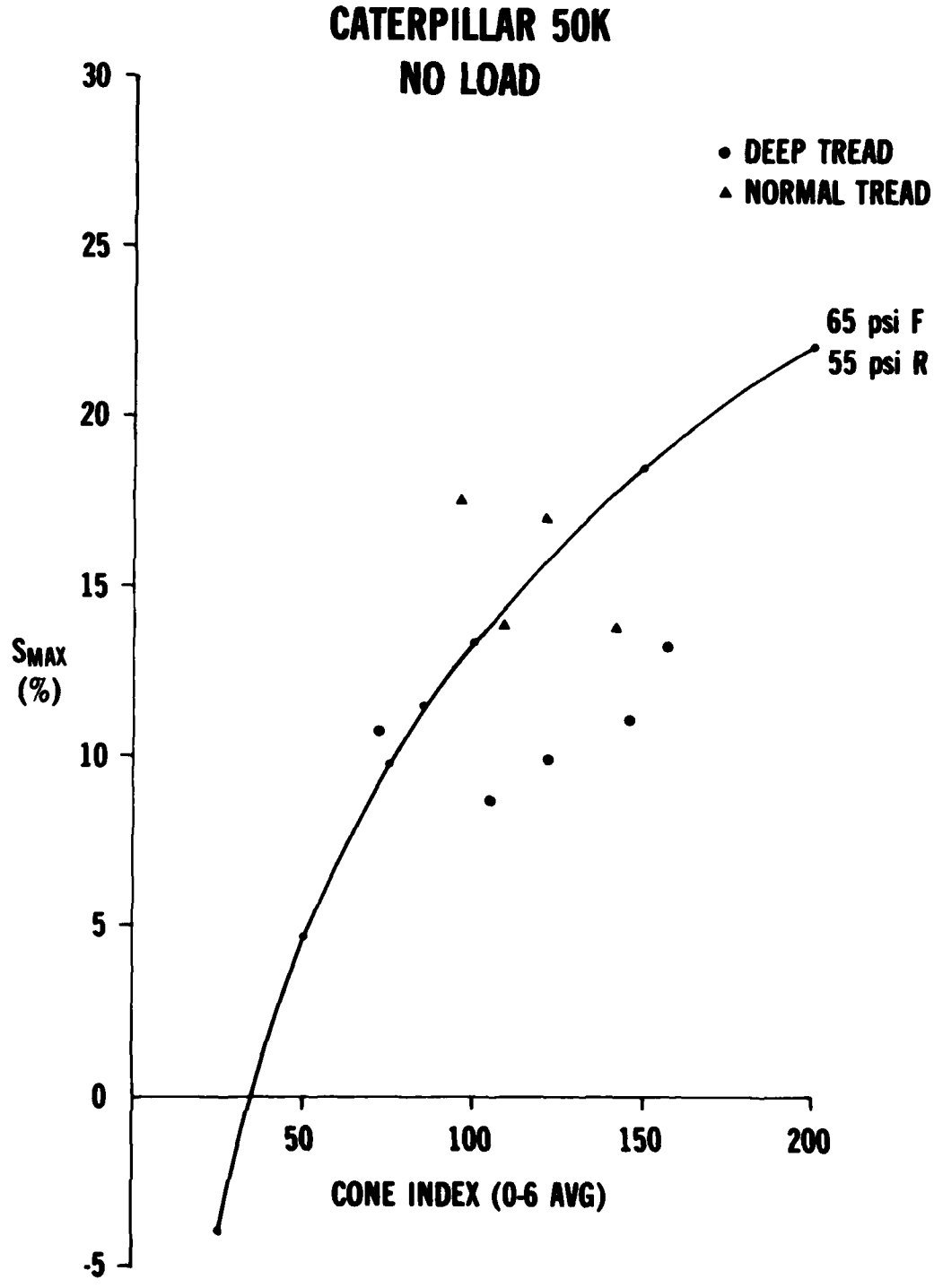
Deep Tread

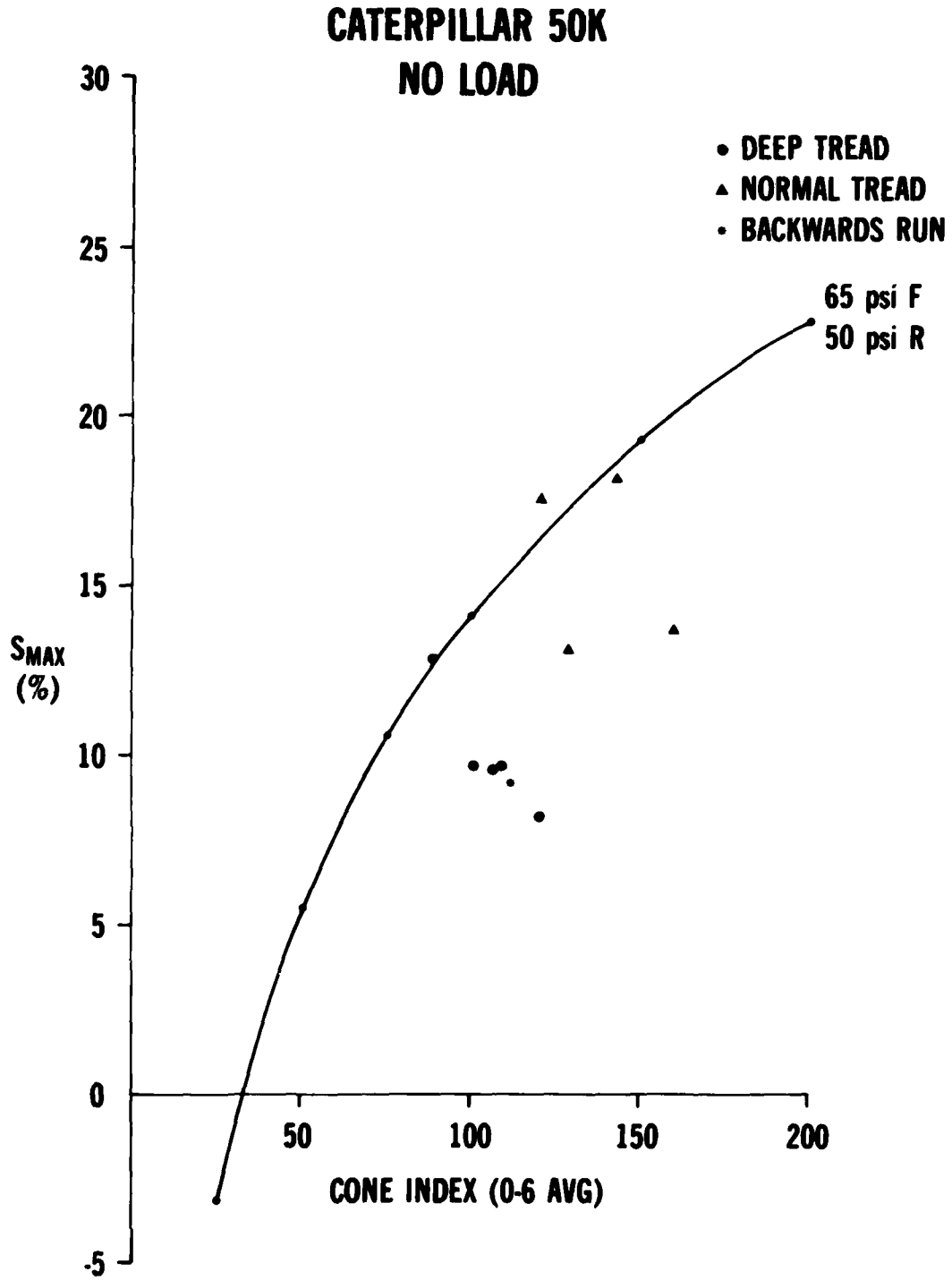
Load	TP_F	TP_R	Average Cone Index Readings					CI Avg			% S	Dune	Run #	Date
			SFC	3"	6"	9"	12"	0-6"	0-9"	0-12"				
50K	65	45	13	81	171	283	384	88	137	186	8.1	3	57	6/13/78
			12	89	217	374	529	106	173	245	5.3	4	58	
			12	76	160	304	451	83	138	201	12.3	9	59	
0	60	45	13	68	144	219	315	75	111	152	14.0	9	60	
			12	124	264	455	647	134	214	301	7.0	4	61	
			13	148	335	519	694	165	254	342	10.3	3	62	
			12	114	245	424	642	124	199	288	7.9	10	63	
			25	154	324	487	632	168	247	324	16.6	9	100	6/15/78
50K			23	140	283	413	557	149	215	283	8.9	4	101	
			22	99	216	486	674	112	206	299	13.7	9	102	
			22	100	234	432	694	119	197	296	12.6	9	103	
			25	125	277	496	721	142	231	328	13.0	9	104	
			23	112	249	452	704	128	209	308	10.4	9	105	

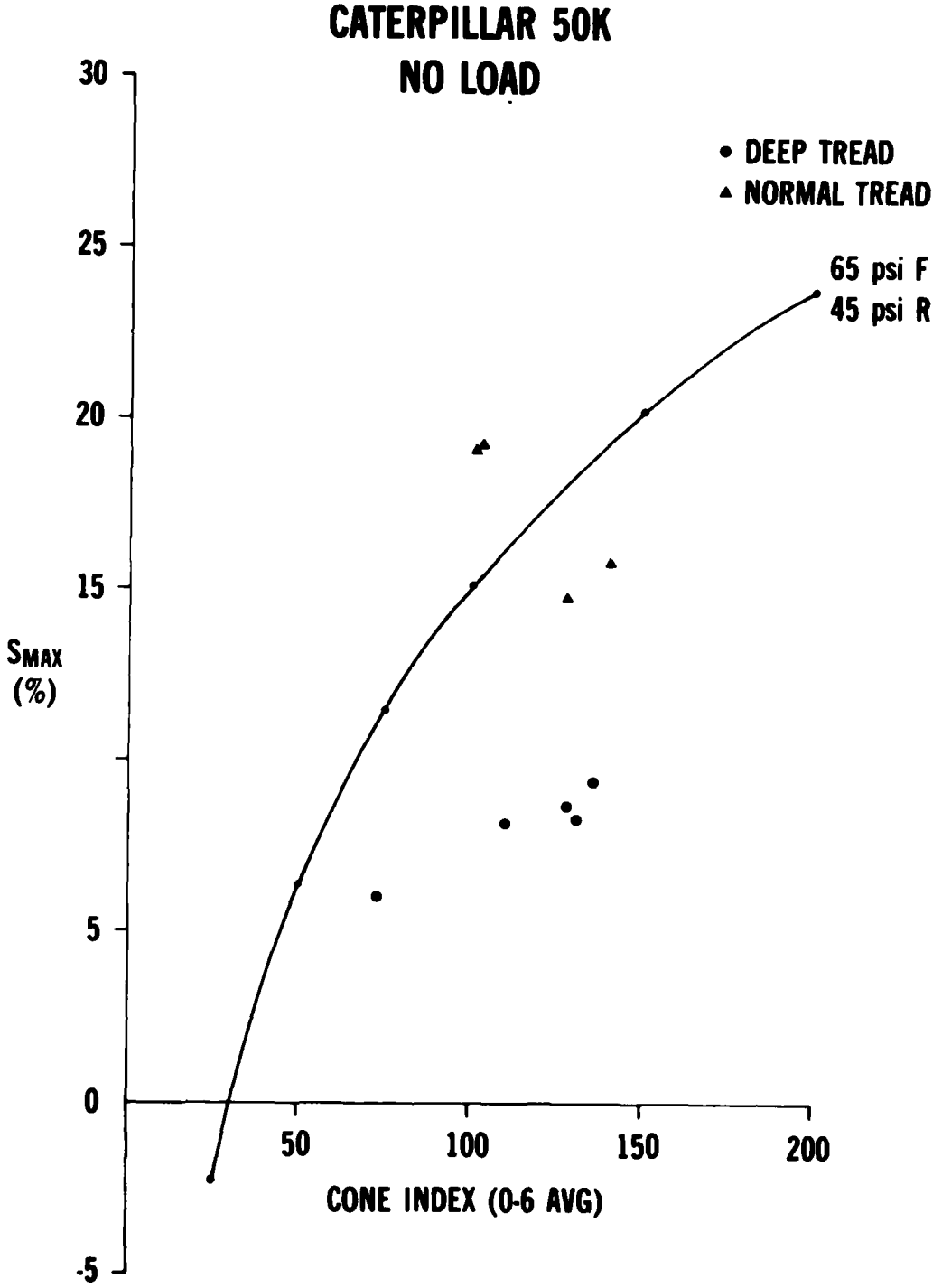

CATERPILLAR 50K
NO LOAD
• DEEP TREAD
▲ NORMAL TREAD
90 psi F
55 psi R
30
25
20
15
10
5
0
-5
SMAX
(%)
50
100
150
200
CONE INDEX (0-6 AVG)

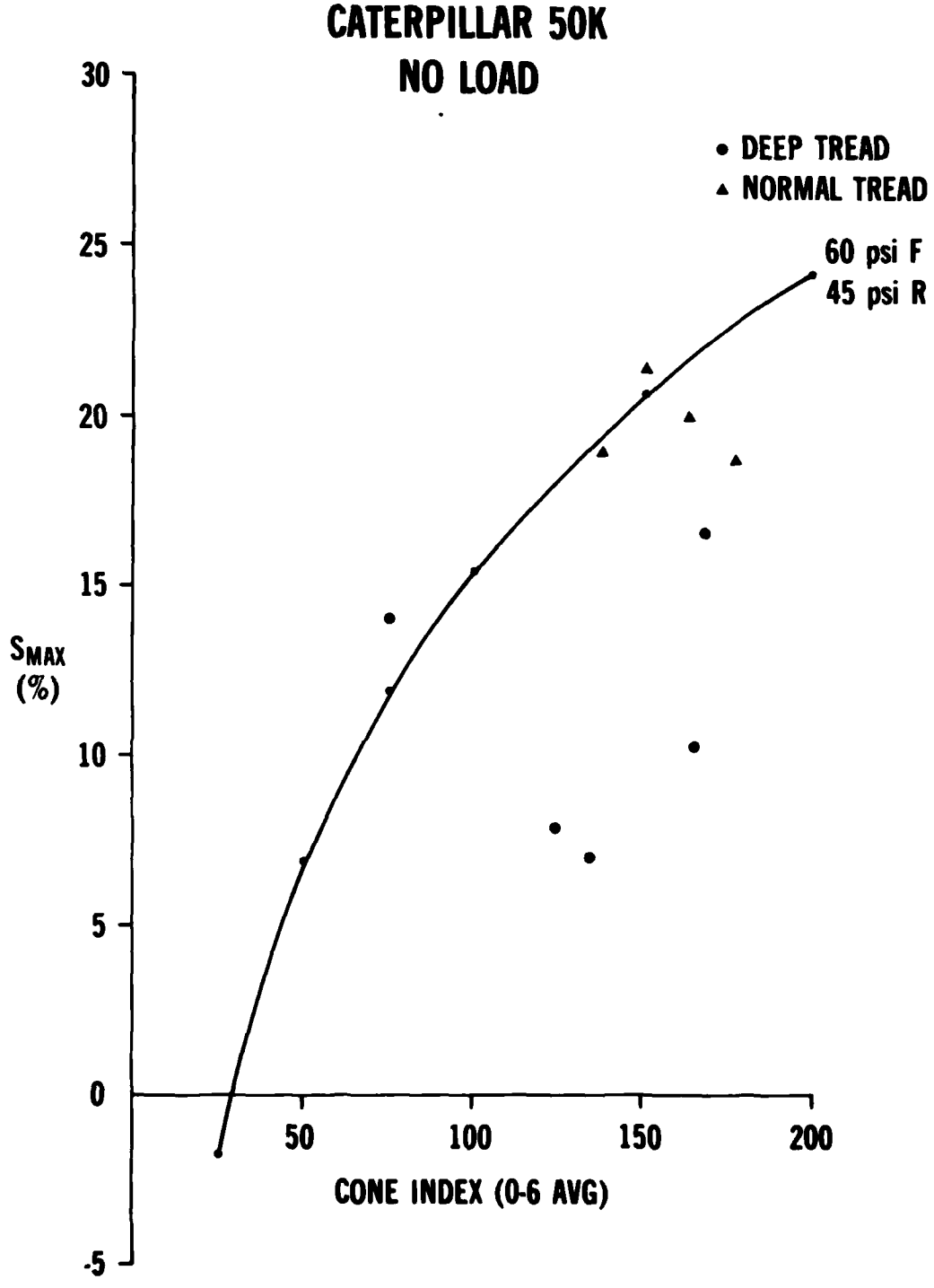

CATERPILLAR 50K
NO LOAD
• DEEP TREAD
▲ NORMAL DEPTH
80 psi F
55 psi R
30
25
20
15
10
5
0
-5
SMAX
(%)
50
100
150
200
CONE INDEX (0-6 AVG)

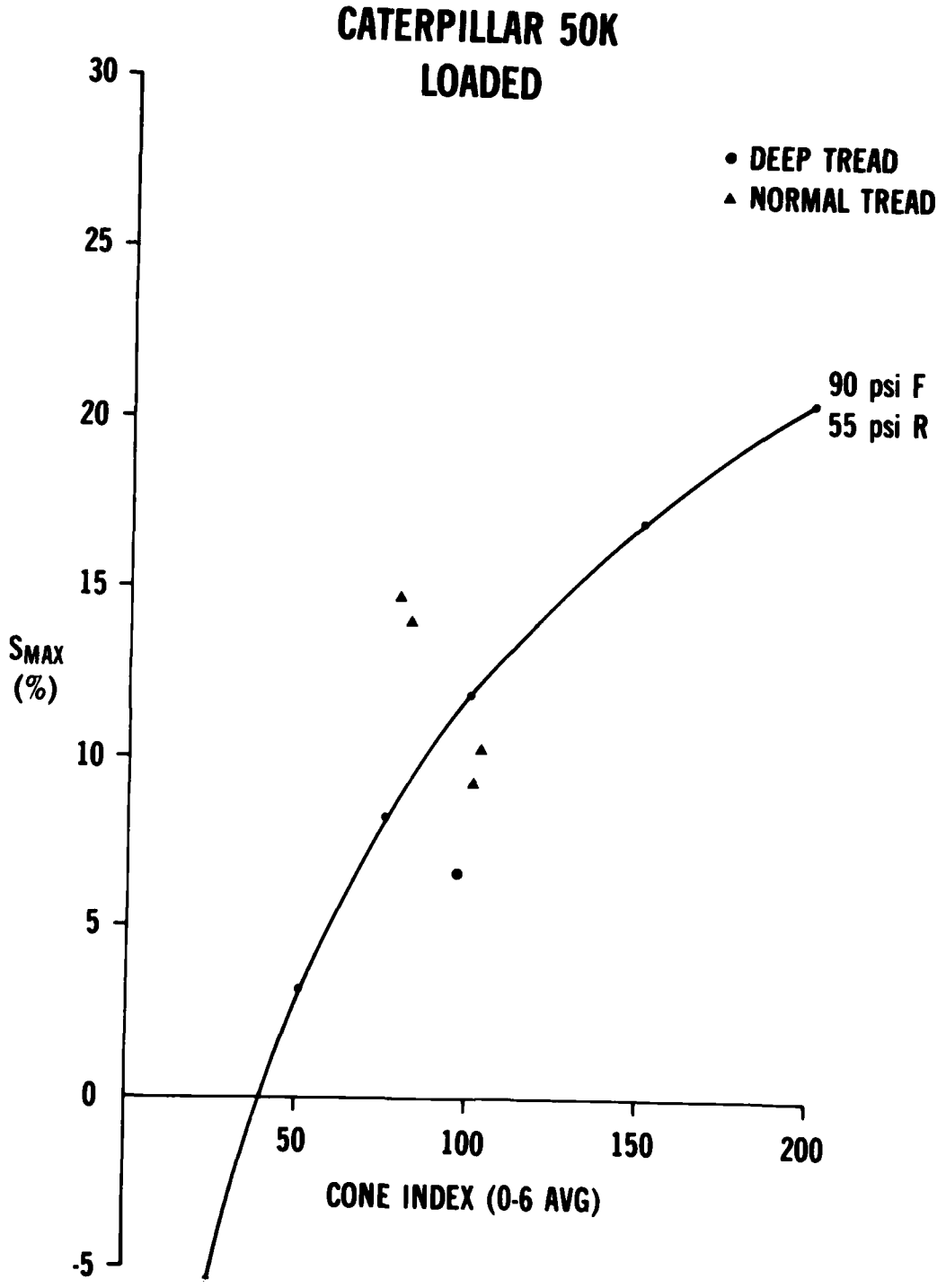

CATERPILLAR 50K
NO LOAD
• DEEP TREAD
▲ NORMAL TREAD
75 psi F
55 psi R
30
25
20
15
10
5
0
-5
SMAX
(%)
50
100
150
200
CONE INDEX (0-6 AVG)

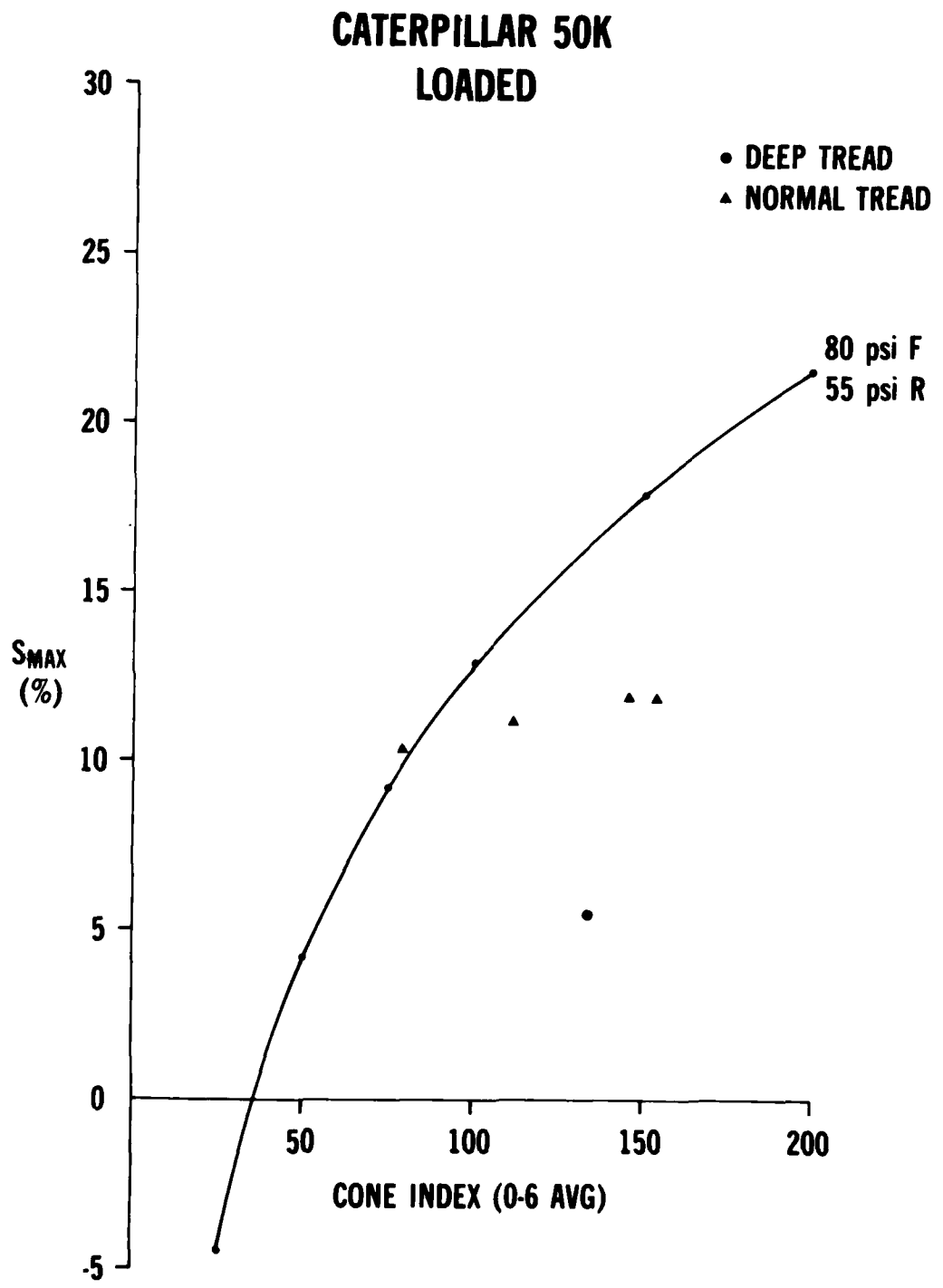

CATERPILLAR 50K
NO LOAD
DEEP TREAD
NORMAL TREAD
65 psi F
55 psi R
30
25
20
15
10
5
0
-5
SMAX
(%)
50
100
150
200
CONE INDEX (0-6 AVG)

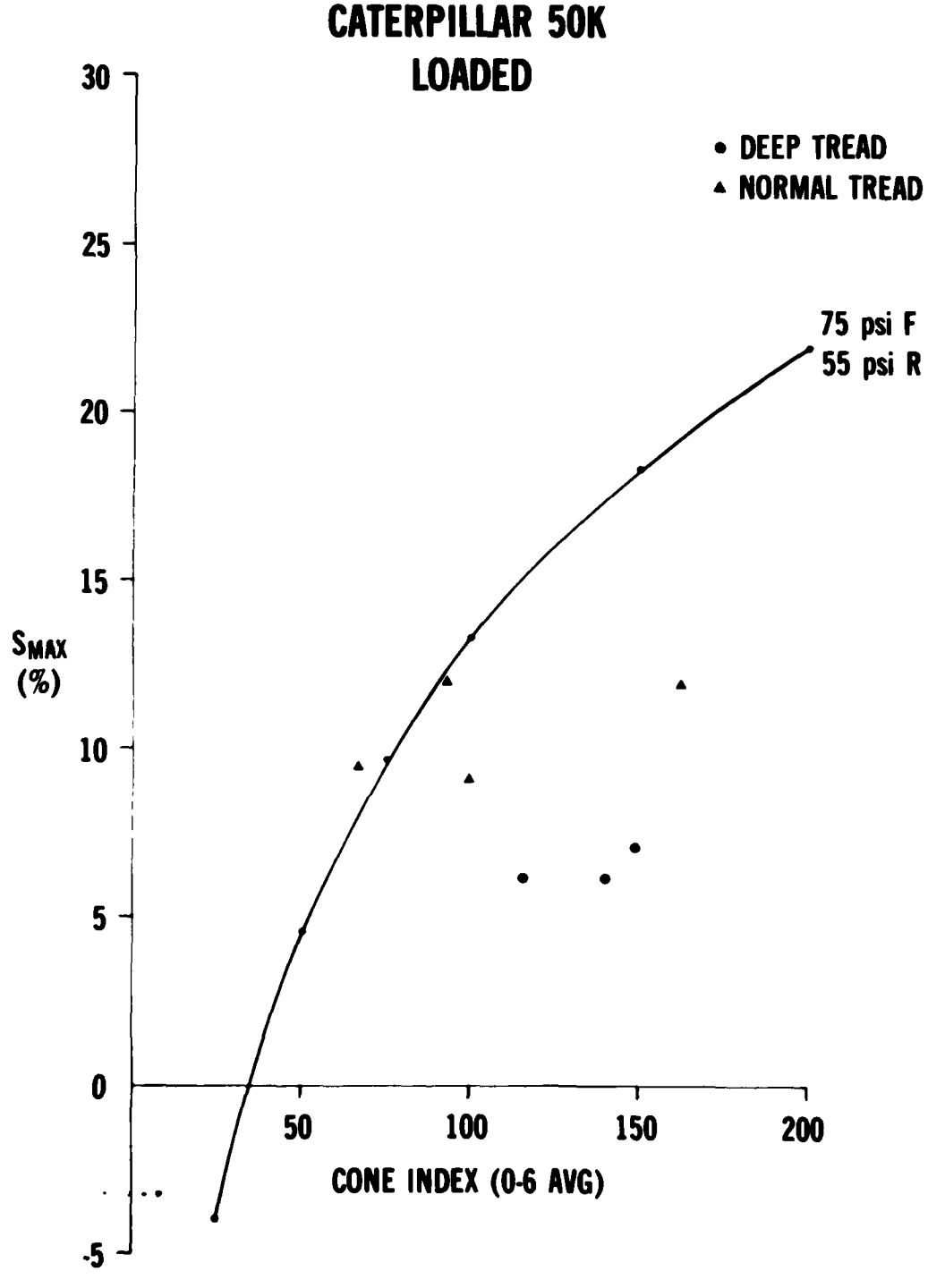

CATERPILLAR 50K
NO LOAD
• DEEP TREAD
▲ NORMAL TREAD
• BACKWARDS RUN
65 psi F
50 psi R
30
25
20
15
10
5
0
-5
SMAX
(%)
50
100
150
200
CONE INDEX (0-6 AVG)

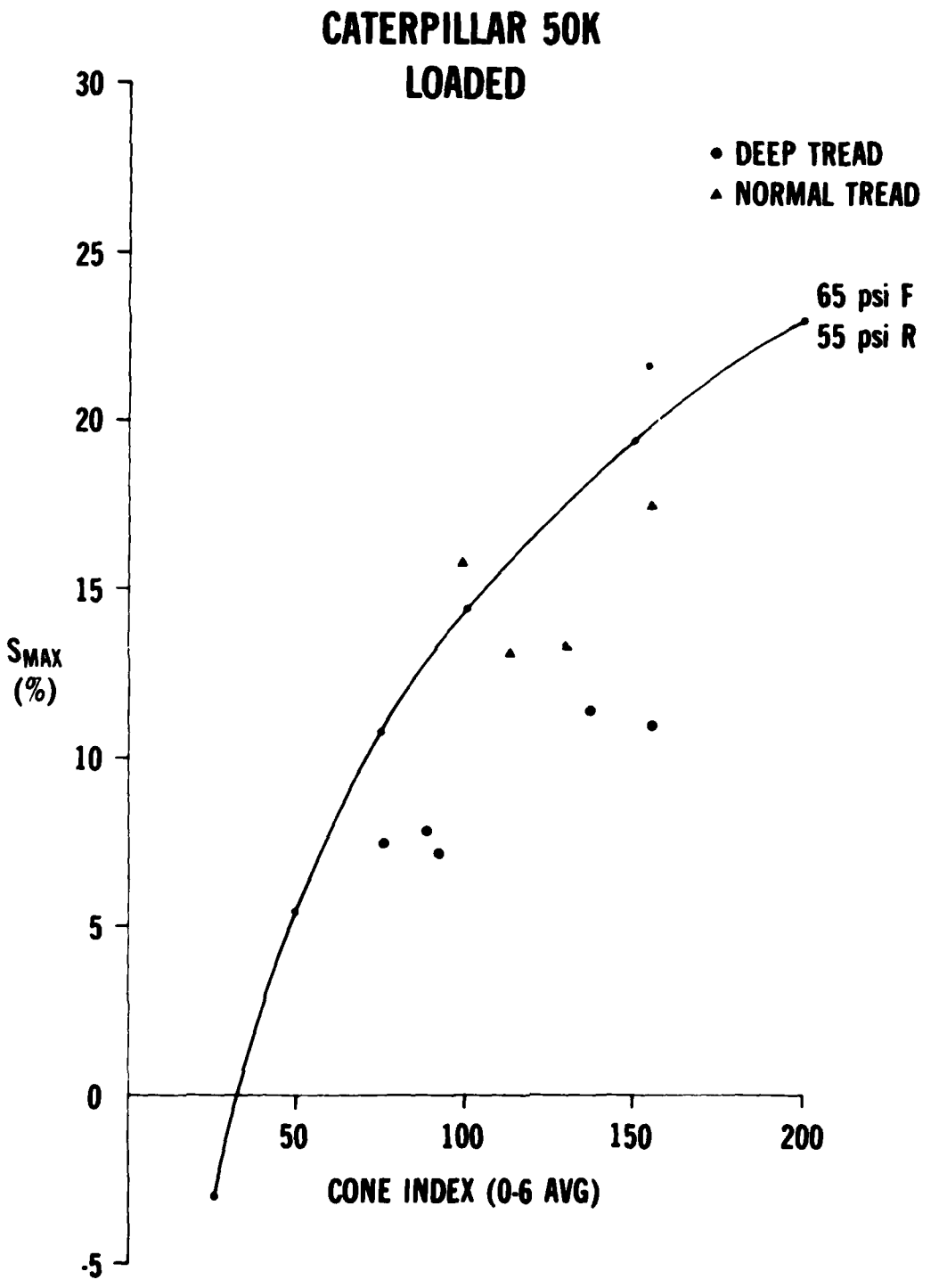

CATERPILLAR 50K
NO LOAD
• DEEP TREAD
▲ NORMAL TREAD
65 psi F
45 psi R
30
25
20
15
5
0
-5
SMAX
(%)
50
100
150
200
CONE INDEX (0-6 AVG)

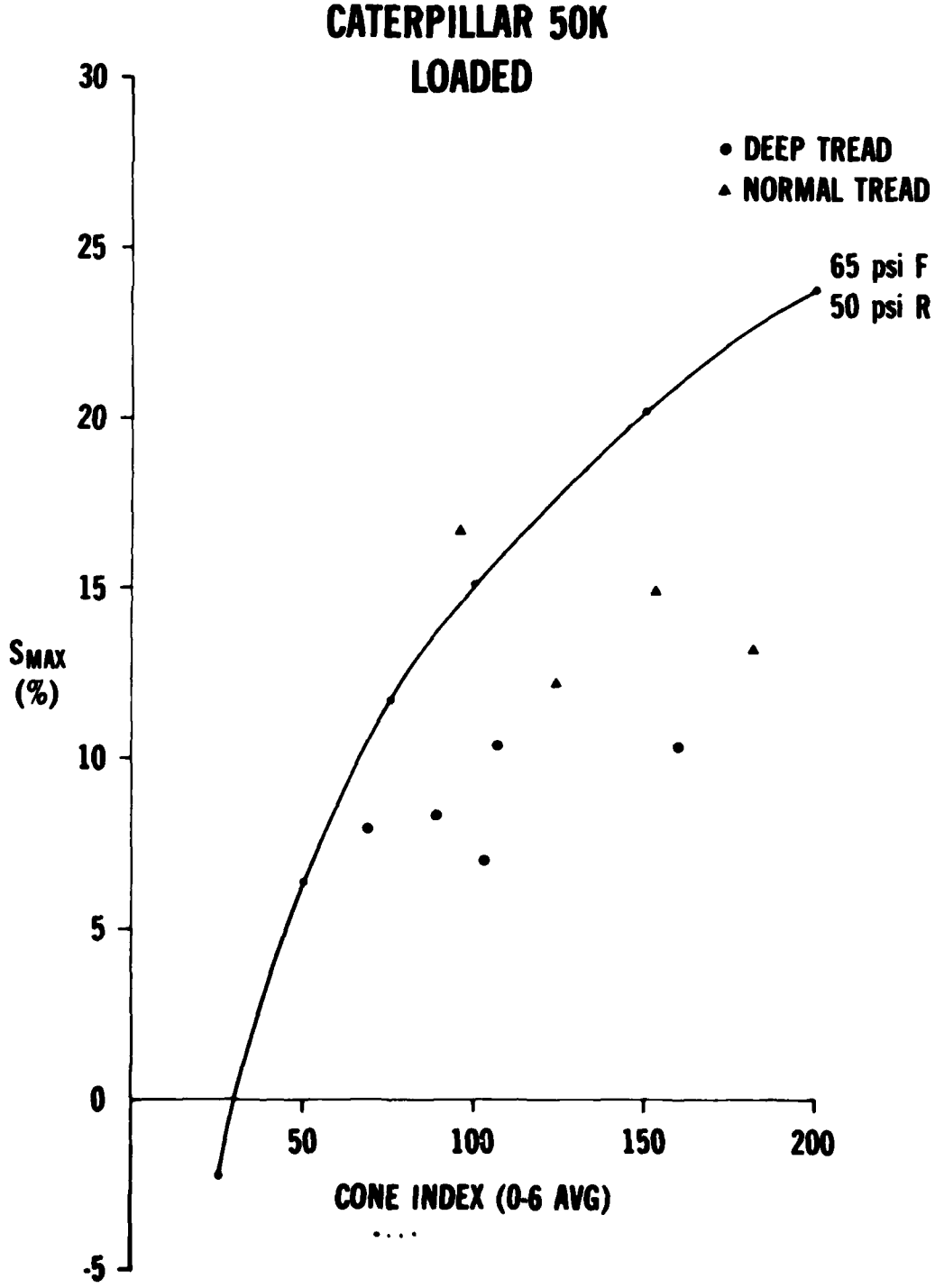

CATERPILLAR 50K
NO LOAD
• DEEP TREAD
▲ NORMAL TREAD
60 psi F
45 psi R
30
25
20
15
10
5
0
-5
SMAX
(%)
50
100
150
200
CONE INDEX (0-6 AVG)

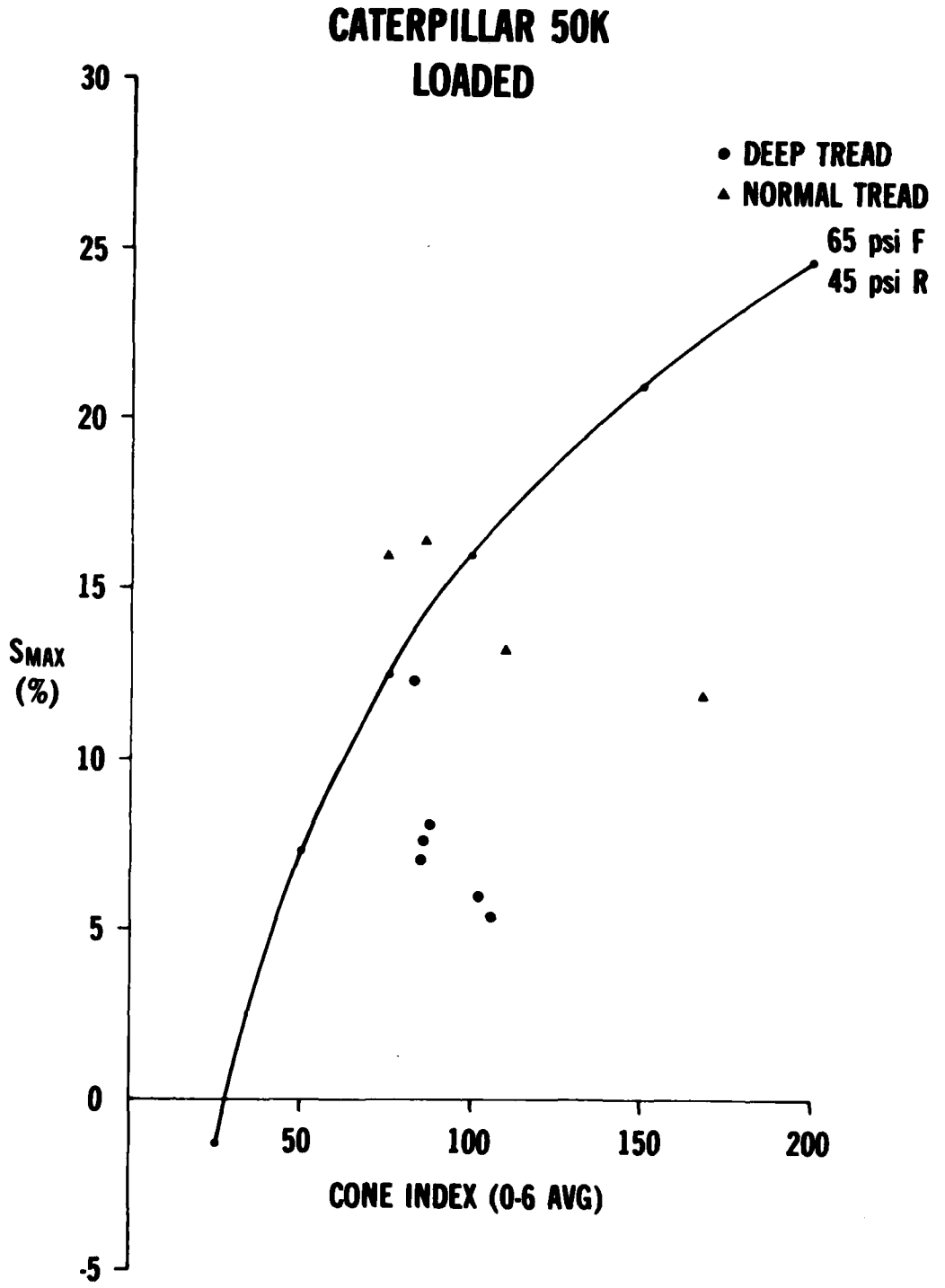

CATERPILLAR 50K
LOADED
• DEEP TREAD
▲ NORMAL TREAD
90 psi F
55 psi R
30
25
20
15
10
5
0
-5
SMAX
(%)
50
100
150
200
CONE INDEX (0-6 AVG)

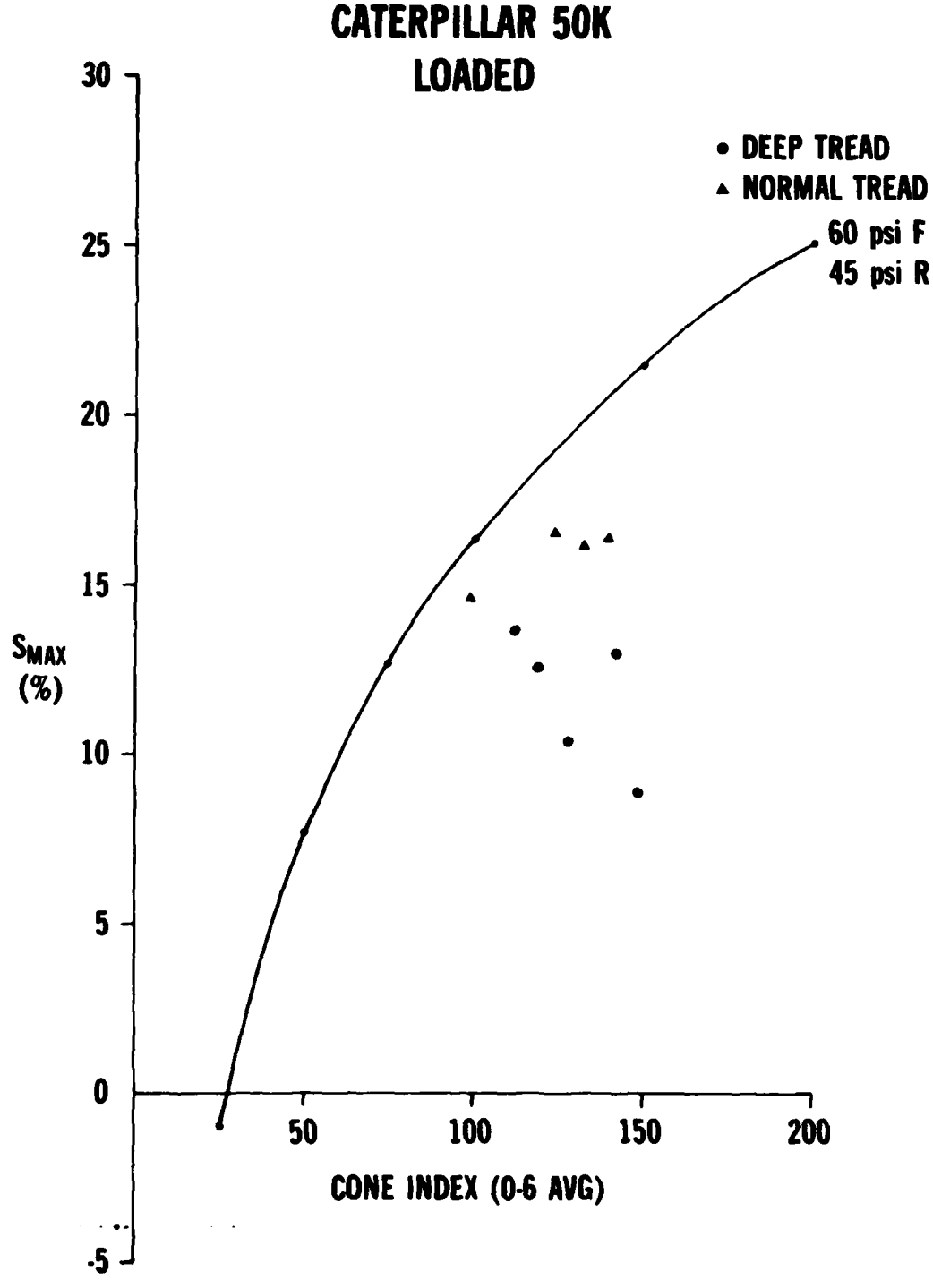

CATERPILLAR 50K
LOADED
• DEEP TREAD
▲ NORMAL TREAD
80 psi F
55 psi R
30
25
20
15
10
5
0
-5
SMAX
(%)
50
100
150
200
CONE INDEX (0-6 AVG)


CATERPILLAR 50K
LOADED
• DEEP TREAD
▲ NORMAL TREAD
75 psi F
55 psi R
30
25
20
15
10
5
0
-5
SMAX
(%)
50
100
150
200
CONE INDEX (0-6 AVG)


CATERPILLAR 50K
LOADED
• DEEP TREAD
▲ NORMAL TREAD
65 psi F
55 psi R
30
25
20
15
10
5
0
-5
SMAX
(%)
50
100
150
200
CONE INDEX (0-6 AVG)


CATERPILLAR 50K
LOADED
• DEEP TREAD
▲ NORMAL TREAD
65 psi F
50 psi R
30
25
20
15
10
5
0
-5
SMAX
(%)
50
100
150
200
CONE INDEX (0-6 AVG)


CATERPILLAR 50K
LOADED
30
25
20
15
10
5
0
-5
SMAX
(%)
• DEEP TREAD
▲ NORMAL TREAD
65 psi F
45 psi R
50
100
150
200
CONE INDEX (0-6 AVG)


CATERPILLAR 50K
LOADED
• DEEP TREAD
▲ NORMAL TREAD
60 psi F
45 psi R
30
25
20
15
10
5
0
-5
SMAX
(%)
50
100
150
200
CONE INDEX (0-6 AVG)

Caterpillar 50K Jun 78

Deep Tread

CI_{0-6} Avg	Data % S	Data % S for CI=110	Calc % S for CI=110	TP_F/TP_R	Load
107	7.8	8.1	12.2	90/55	0
87	6.2	9.1			
133	7.4	5.0			
112	7.0	6.8			
119	7.6	6.6			
97	6.6	8.2	13.5		50
134	5.5	3.0	14.5	80/55	50
114	11.4	10.95	13.2		0
113	15.5	15.1			
115	13.2	12.6			
118	11.3	10.4			
128	8.9	7.0			
97	8.5	10.1	13.7	75/55	0
128	10.4	8.5			
68	11.2	17.2			
105	9.1	9.7			
138	10.6	7.8			
116	6.2	5.5	15.0		50
149	7.1	3.3			
140	6.2	3.2			
146	11.1	7.6	14.6	65/55	0
105	8.7	9.3			
122	9.7	8.4			
72	10.9	16.2			
157	13.3	8.8			
76	7.5	12.1	15.9		50
137	11.4	8.6			
89	7.9	10.6			
155	11.0	6.7			
92	7.6	9.8			
103	7.0	7.8	16.7	65/50	50
160	10.4	5.7			
79	7.9	12.1			
107	10.4	10.7			
89	8.3	10.95			
89	12.9	15.6	15.4		0
101	9.7	10.8			
120	8.2	7.1			
107	9.6	9.9			

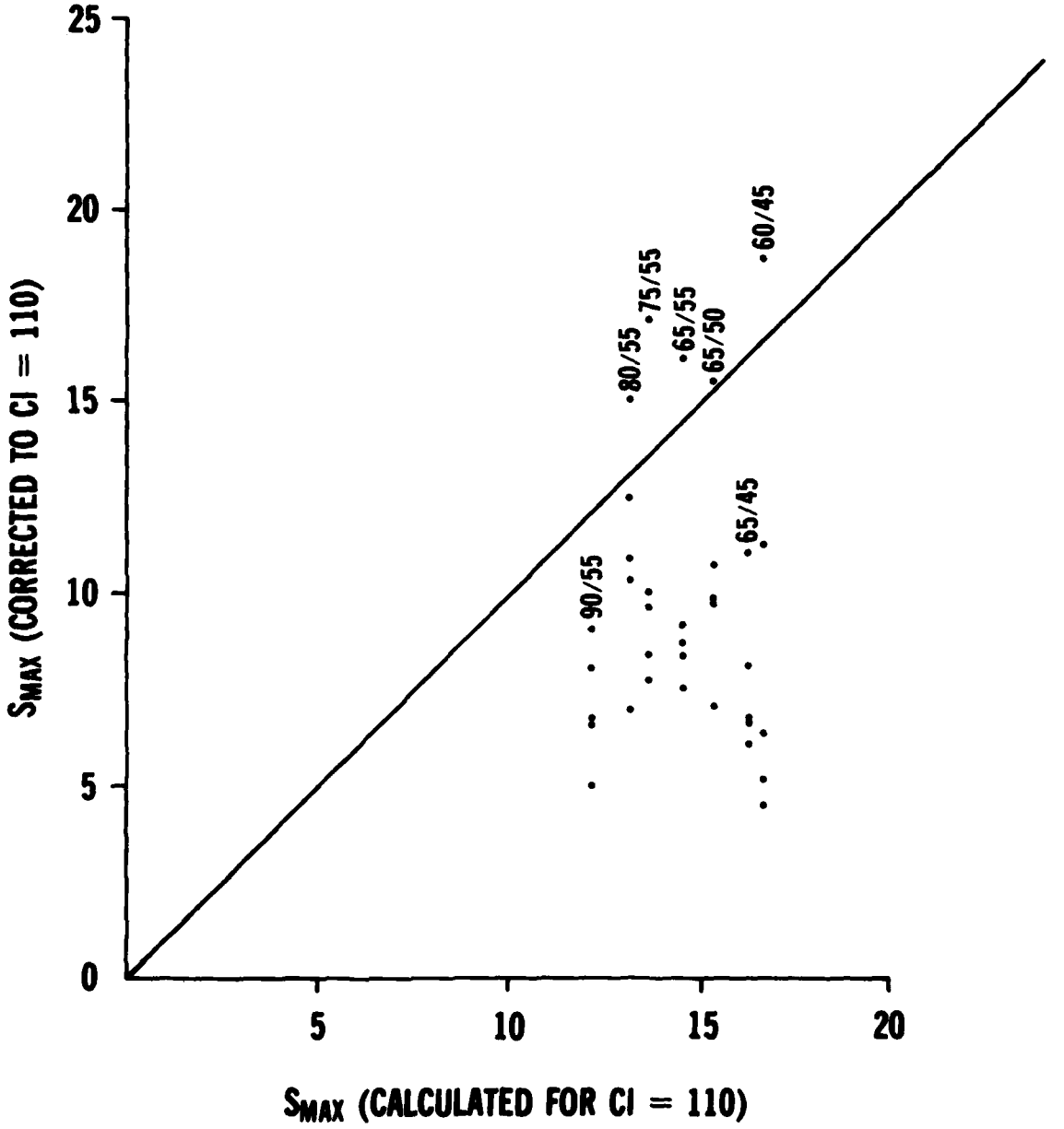
Caterpillar 50K Jun 78 (Cont'd)

Deep Tread

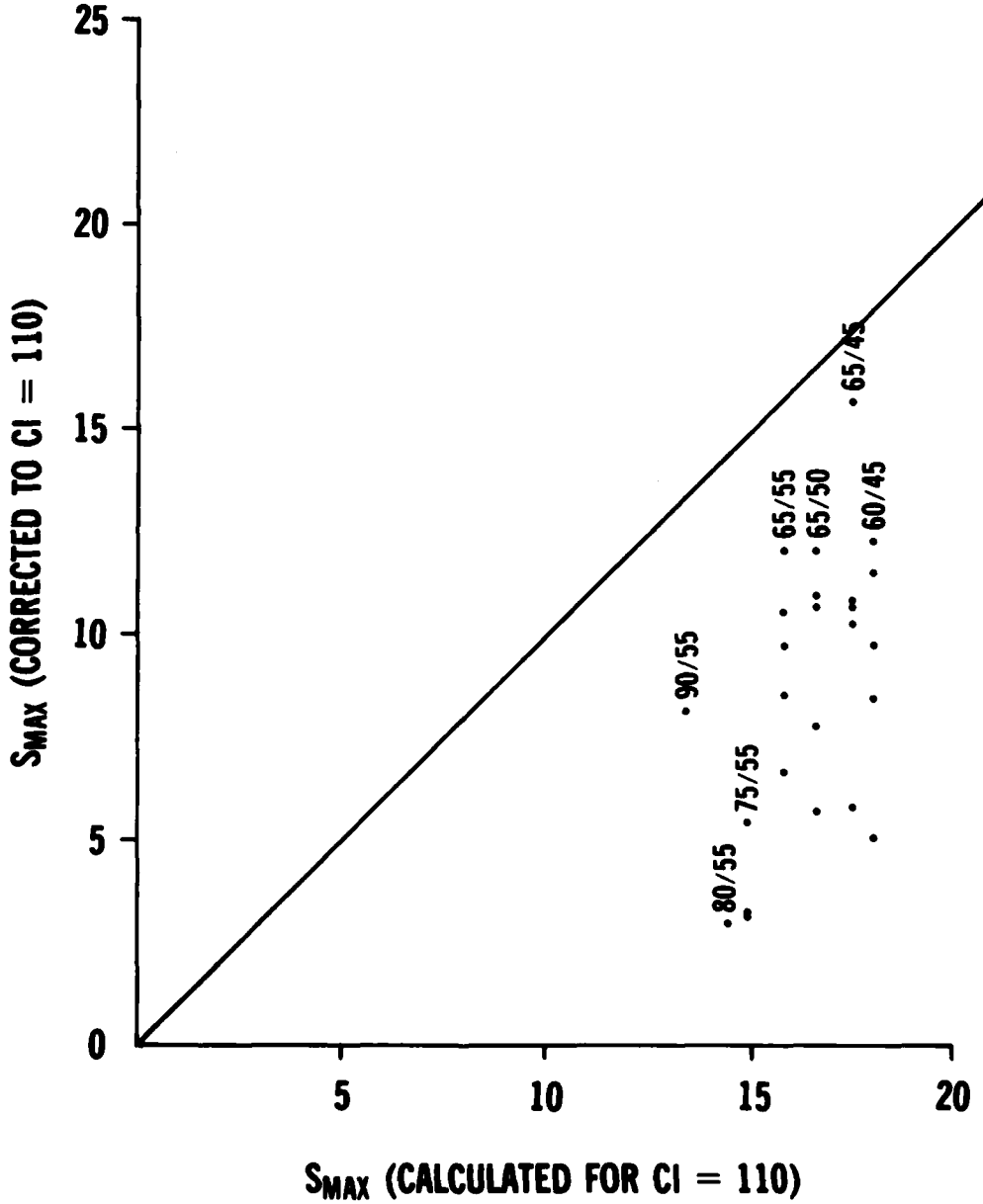
CI_{0-6} Avg	Data % S	Data % S for CI=110	Calc % S for CI=110	TP_F/TP_R	Load
109	9.7	9.8	15.4	65/50	0
112	9.2	8.97	15.4	65/50	0*
73	6.0	11.1	16.3	65/45	0
110	8.2	8.2			
136	9.4	6.7			
131	8.3	6.1			
128	8.7	6.8			
85	7.1	10.3	17.6		50
86	7.6	10.7			
88	8.1	10.9			
106	5.3	5.8			
83	12.3	15.8			
75	14.0	18.8	16.7	60/45	0
134	7.0	4.5			
165	10.3	5.2			
124	7.9	6.4			
168	16.6	11.3			
149	8.9	5.1	18.1		50
112	13.7	12.4			
119	12.6	11.6			
142	13.0	9.8			
128	10.4	8.5			

*Test vehicle ran backwards up dune.

CATERPILLAR NO LOAD
JUN 78
DEEP TREAD



CATERPILLAR 50K LOAD
JUN 78
DEEP TREAD



Caterpillar 50K Jun 78

Normal Tread

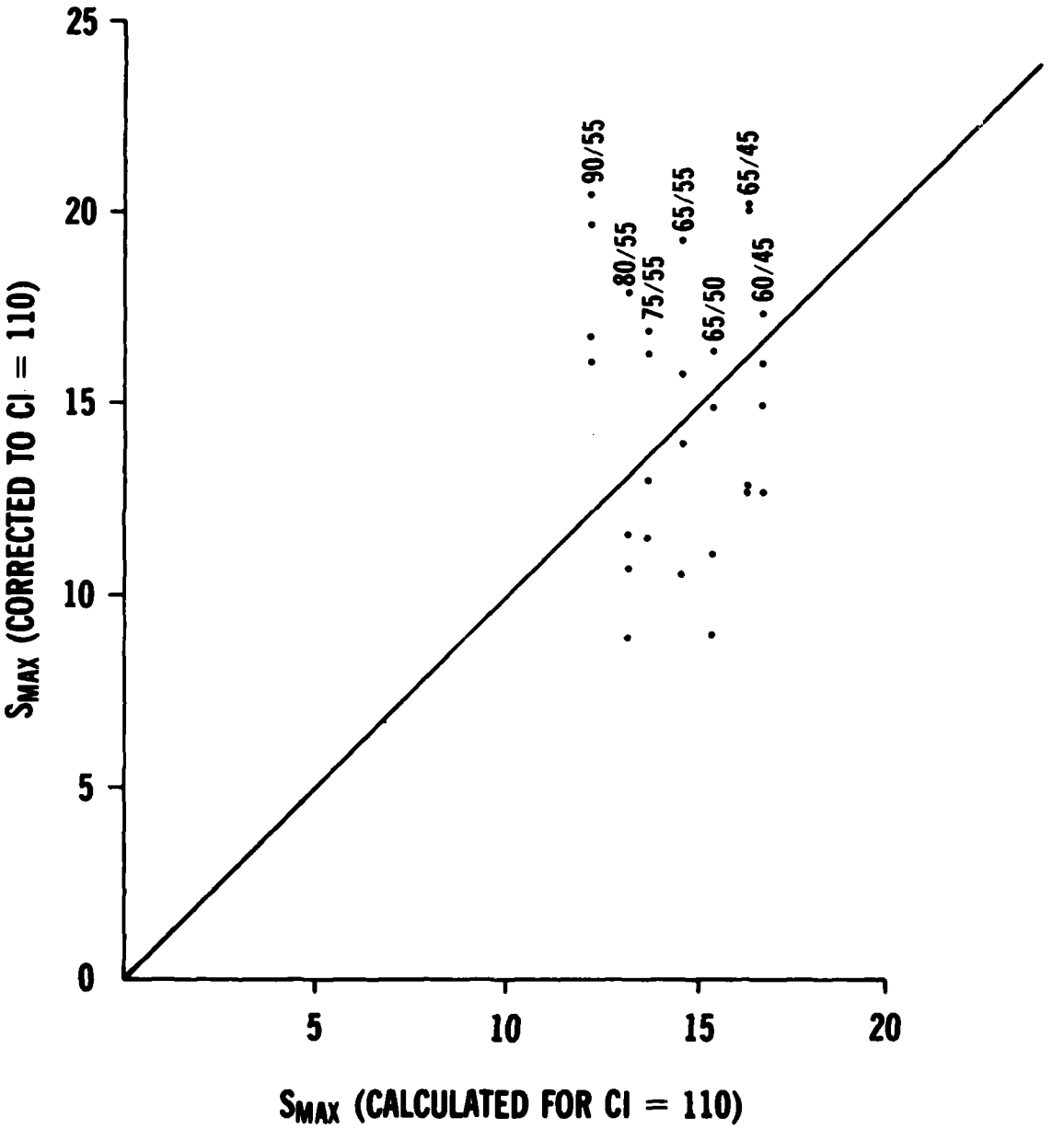
CI_{0-6} Avg	Data % S	Data %S for CI = 110	Calc % S for CI = 110	TP_F/TP_R	Load
103	10.3	11.1	13.5	90/55	50
82	14.1	17.8			
79	14.8	18.95			
101	9.3	10.4			
78	16.2	20.5	12.2		0
83	12.6	16.1			
93	17.6	19.7			
104	16.1	16.8			
127	13.4	11.6	13.2	80/55	0
163	13.8	8.9			
139	13.6	10.7			
97	16.4	17.97			
154	11.9	7.7	14.5		50
112	11.2	10.97			
146	11.9	8.4			
80	10.4	14.4			
163	12.0	7.1	15.0	75/55	50
67	9.5	15.7			
93	12.0	14.1			
100	9.1	10.3			
135	14.1	11.5	13.7		0
120	18.0	16.9			
116	13.7	13.0			
123	17.7	16.3			
155	17.5	13.2	15.9	65/55	50
113	13.1	12.8			
99	15.8	17.1			
130	13.3	11.2			
121	17.0	15.8	14.6		0
109	13.9	14.0			
142	13.8	10.6			
96	17.6	19.3			
129	13.1	11.1	15.4	65/50	0
143	18.2	14.9			
160	13.7	9.0			
121	17.6	16.4			
182	13.2	6.9	16.7		50
154	14.9	10.7			
124	12.2	10.7			

Caterpillar 50K Jun 78

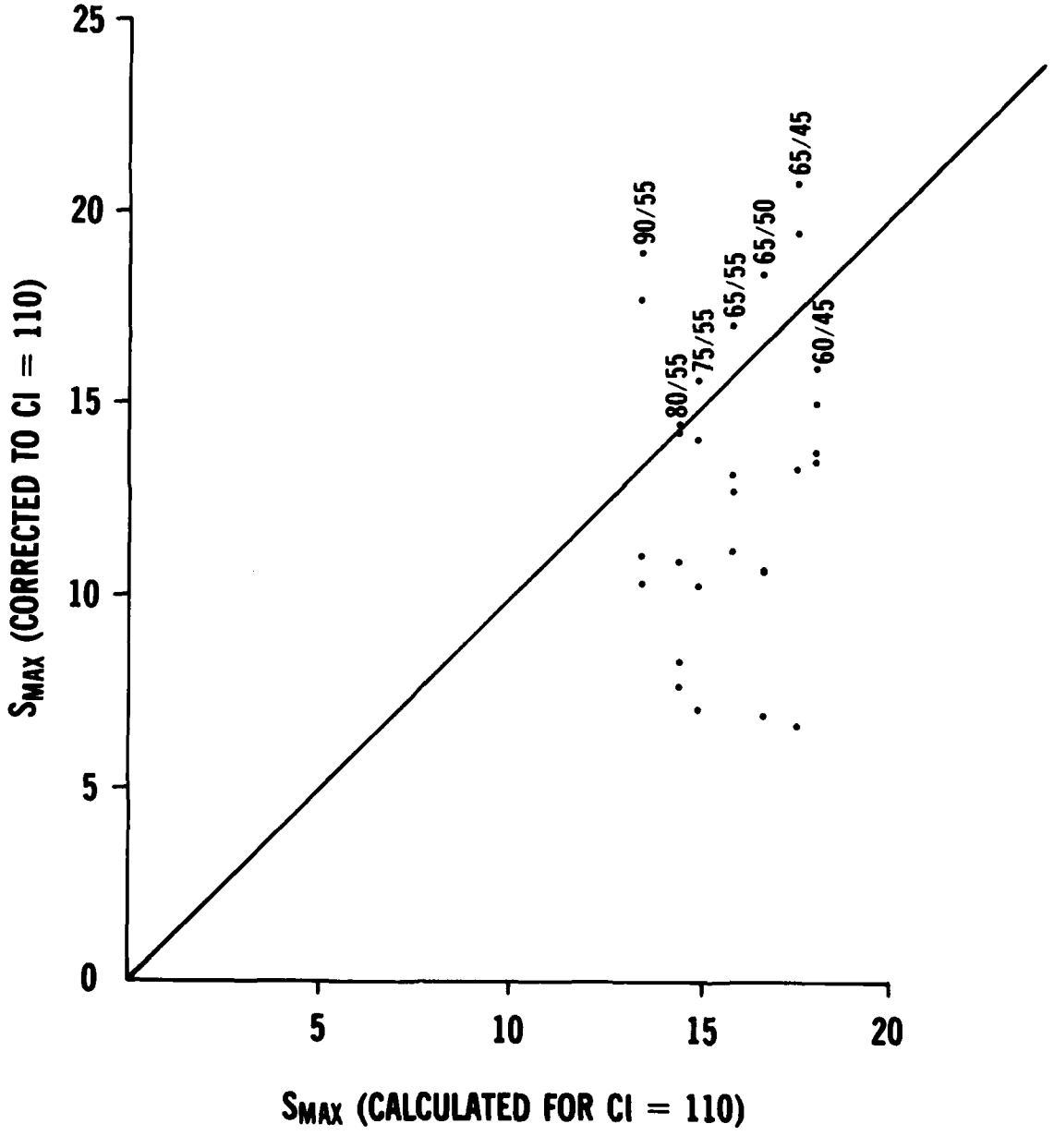
Normal Tread

CI_{0-6} Avg	Data % S	Data %S for CI = 110	Calc % S for CI = 110	TP_P/TP_R	Load
96	16.7	18.4	16.7	65/50	50
168	11.9	6.6	17.6	65/45	50
86	16.4	19.5			
110	13.3	13.3			
75	16.0	20.8			
128	14.8	12.9	16.3		0
103	19.3	20.1			
141	15.8	12.7			
101	19.1	20.2			
99	14.7	16.0	18.1	60/45	50
124	16.6	15.1			
133	16.2	13.8			
140	16.5	13.5			
177 18	18.7	12.7	16.7		0
138	18.9	16.1			
151	21.4	17.4			
163	19.9	14.96			

CATERPILLAR NO LOAD
JUN 78
NORMAL TREAD



CATERPILLAR 50K LOAD
JUN 78
NORMAL TREAD



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